MIDWEST ENGINEER

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

SERVING THE ENGINEERING PROFESSION

80TH ANNIVERSARY OF WESTERN SOCIETY OF ENGINEERS

VOL. 1 MAY, 1949 NO. 9

YOU CAN BE SURE..IF IT'S Westinghouse

Above are six simple words associated with the name of a corporation . . .
Perhaps the phrase is something of an insight into what's right with America.

It says, between the lines, that our 72,205 owners have dug down deep and have put up $5,750 for each and every Westinghouse worker, to provide for them the finest shops and tools and equipment. The owners intend that *You can be SURE.*

It says, between the lines, that our 106,353 workers like and propose to continue their career of making good things with good tools at good wages. In their own self-interest, they too intend that *You can be SURE.*

It says, between the lines, that the American standard of living is highest in the world . . . not by accident, but by plan . . . by the simple determination of owners and workers to give purchasers the biggest dollar's worth in the world.

Making sure this way, all along the line, is what helps Americans make more money making more things; it is what helps Americans *have* more good things, *enjoy* more good things, *believe in* more good things.

These seven words are by way of being a theme we sell by . . . . .

But more, they are a philosophy we live by. It is our way of being better Americans.

YOU CAN BE SURE..IF IT'S Westinghouse

WESTINGHOUSE ELECTRIC CORPORATION
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GENERAL AND EDITORIAL OFFICES
HEADQUARTERS OF
WESTERN SOCIETY OF ENGINEERS
84 E. RANDOLPH STREET
CHICAGO 1, ILLINOIS
TELEPHONE: RA NDOLPH 6—1736

DONALD V. STEGER
Executive Editor

BARBARITA M. ANDREWS
Production Supervisor

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MIDWEST ENGINEER

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession

May, 1949 Vol. 1, No. 9

Contents

COVER:

A view of Clark Street in downtown Chicago, about 1870.

COMING IN THE NEXT ISSUE:

September, 1949, will be the next publishing date of MIDWEST ENGINEER. Vol. 1 concludes with this issue.

WSE Offices will be closed on Saturday during June, July, and August.

TOWARD NEW HORIZONS

On May 25, 1949 on the occasion of the 80th anniversary of its founding, the Western Society of Engineers will formally dedicate its new headquarters at 84 E. Randolph St. in Chicago. A $100,000 project which required the modernization of three full floors in the Taylor Building, it completes the first step in the creation of an Engineering and Science Center where various engineering and scientific groups may eventually locate their headquarters in an environment stimulating to their progress and worthy of the engineering profession and the community. The dedication of these facilities will mark a significant point in the long history of the Society, since a general engineer-society composed of individual members will now for the first time in Chicago have quarters befitting the immediate needs of the local engineering profession.

Appropriately, this space is leased from the John Crerar Library Foundation, owners of the Taylor Building, which is located immediately to the west of the main building housing the John Crerar Library itself at the northwest corner of Randolph Street and Michigan Blvd. Here, across the street from the Chicago Public Library and adjacent to the outstanding collection of technical information in the John Crerar Library and physically connecting therewith, the Society has quarters serving the needs of engineers in an atmosphere of comfort, friendliness, and conservatism.

Accommodations

The 5th, 6th and 7th floors of the Taylor Building total some 9,000 sq. ft. of space. The 7th floor includes an acoustically treated and well-lighted auditorium, equipped with modern public address and picture projection systems which permit varied and effective program presentation. This auditorium will accommodate 200 people in comfortable theatre-type seats. An adjoining room, seating 100, may be used separately or in combination with the main auditorium to seat a combined audience of 300. A small conference room suitable for a group of 20 is also located on this floor.

The 6th floor includes staff offices and storage space, check-room facilities and a large lounge furnished in the modern style. This lounge is regularly available to members and guests from the noon hour until 10 p.m., Monday through Friday. The 5th floor houses the Chicago office of the Engineering Societies Personnel Service, a non-profit engineering employment service which is sponsored in Chicago by the Western Society of Engineers and the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining and Metallurgical Engineers.

The acoustically treated dining room which seats 125 people, is also located on the 5th floor. A complete kitchen with modern food storage and preparation equipment is adjacent to the dining room. Operation of the dining facilities is currently performed by the Edmanson-Bock Catering Co., Inc., on a concession basis. The dining room is open for luncheon and dinner on a 5-day basis, with a suitable choice of menus and at moderate prices. Special parties or dinner meetings may also be arranged both during the business week and on weekends where such use does not conflict with normal WSE use.

Planning

The idea of more commodious and convenient quarters has long been in the minds of many Western Society members. The formation of definite plans was recommended by the Development Committee in 1945 in anticipation of the expiration of our lease in the Engineering Building at Wells & Wacker Drive in April, 1948. A special committee, termed the "Headquarters Committee" was accordingly appointed for the 1946-7 season and set to work to develop a detailed plan. First consideration was given to the desirability and possible utility of a large, pretentious building to serve as an engineering center, but this was recognized as impractical for the initial project although it was deemed a worthy objective.

The Headquarters Committee approached its task along two lines, the first comprising a survey of requirements and the second an investigation of possible locations. The survey of requirements developed a number of salient facts:

(a) Approximately 40 technical societies might be considered as potential users of meeting room facilities. These were found to average seven meetings per season or a total of about 280 meetings. The 23 societies most likely to use such quarters total about 200 meetings per season. Western Society meetings were not included in this tabulation.

(b) Meetings were fairly uniformly distributed over the possible 190 days

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Signing the lease, December 3, 1947. Seated, Wm. V. Kahler and Britton I. Budd. Standing, H. H. Henkle, C. R. Jones, C. B. Borland, D. V. Steger, F. A. Rogers, H. P. Sedwick, J. F. Damman, and E. Gordon Fox.

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which might be considered to constitute a season.

(c) At most of these meetings the attendance averaged about 100 persons. Some societies exceeded this number slightly, while others did not attain it. Only a few societies had meetings which exceeded an attendance of 200. Larger meetings were the exception rather than the rule.

(d) The great majority of technical societies held dinner meetings at times, or desired restaurant facilities in connection with their meetings.

The survey of locations soon developed the possibility of utilizing space adjacent to the John Crerar Library. This was considered so advantageous that attention was concentrated on it at an early stage. Although the available space and the existing construction at 84 E. Randolph St. imposed definite limitations with respect to auditorium capacity, elevator service, etc., these limitations were not considered to prevent effective use of the space, at least in the immediate future. Preliminary studies and layouts were made, discussed and revised until the present plan was evolved and conceded to represent the most advantageous disposition of the space.

Simultaneously, negotiations were carried on with Crerar representatives to develop a feasible and satisfactory basis of cooperation. These negotiations were greatly facilitated by the fact that the Crerar management recognized the existence of a definite and important mutuality of interest between the Library and the Society. In consequence, terms were agreed upon which placed the project in a realm of cost which could be conservatively budgeted. A second factor of considerable significance concerned the arrangements for storage and use of the Western Society's library. The Library Committee of the Society participated faithfully in the analysis and solution of this aspect of the program.

The negotiations culminated in a joint meeting of the Board of Direction and the section and committee chairmen of the Society in May, 1947, at which time the Society committed itself in principle to definite affirmative action. This was confirmed by a resolution at the June meeting of the Board. The details of the lease were worked out thereafter and the ceremony of formal signature took place in the offices of the Crerar Library on December 3, 1947.

Leasing arrangements were complicated by the fact that the floors involved were occupied by a number of tenants whose leases terminated on differing dates. Unfortunately, no part of this space could be secured in time to permit its rehabilitation prior to the termination of our old lease. Hence, an arrangement was made for the temporary occupancy of the 4th floor for office purposes during the period of transition. Agreements with the former occupants covering the subletting of portions of the space to and from the Society permitted access to all floors at dates which enabled rehabilitation work to be carried on simultaneously and therefore most economically. The three floors were leased for somewhat differing periods in order that all of the leases might terminate on a single date, April 30, 1953.

As soon as the leases were signed, definite plans for remodeling were formulated. These followed along the general lines evolved earlier by the Headquarters Committee, but many refinements were introduced for reasons of economy and otherwise by the architects, Holabird and Root and Burgee, whose services were furnished gratuitously to the Society. Every effort was made to utilize partitions and other construction wherever possible in order to minimize the cost and to expedite the work.

Construction

Selection of contractors was made promptly and work on the 5th and 7th floors was initiated in June, 1948. Several weeks later the 6th floor was vacated and work on all floors proceeded with dispatch.

The actual work was complicated however by the fact that complete plans of the present structure were not available. Shortages also did their part in delaying the work. For example, several columns located on the 7th floor had to be removed in order to give clear vision in the auditorium and, due to the shortage of structural steel, concrete girders had to be substituted. Until the beams were of sufficient strength and the forms removed, little work could be done on the 7th floor. Many unforseen problems developed, such as finding wind bracing for the structural frame buried in the wall between the library and our building at a point where the elevator doors were to be installed. A direct current lighting system was completely replaced with an A-C system.

During the construction period, the Society's staff functioned under the most trying circumstances, in cramped quarters on the 4th floor. Despite constant interruptions, the normal administrative functions were carried on and an expanded program undertaken, including the launching of the Midwest Engineer, our magazine.

In spite of many obstacles, work went forward to the satisfactory completion of all major items by February, 1949. The contractors and suppliers furnished all material and labor to do the job without profit or overhead, and, in many cases, much of the material and equipment was given gratuitously or at a

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Above, Lounge

Below, Dining Room

(*Continued from Page 4*)

substantial reduction, which reduced overall costs from what they otherwise would have been. The Society is grateful to the 50 organizations who performed this work or supplied equipment and we are proud to list them in these pages. The excellence of their work is self-evident from an inspection of the completed job.

Financing

Under our lease with Crerar, the major portion of the cost of the projected improvements was to be borne by the Society. A careful estimate based on bids prior to initiating construction indicated that the cost would approximate $100,000. When all bills were received, the total cost to the Society was found to approximate $107,000.

The work of raising the funds necessary to carry out the program was assumed by the Development Committee of the Society. The membership was called upon for voluntary contributions and a goodly portion responded, many with two contributions and some with three. Engineering firms and business organizations interested in the welfare and progress of the engineering profession were solicited, and they too responded generously. As of this writing, total contributions stand at $90,000. Approximately $17,000 must still be raised before all bills are paid.

To those organizations, individuals and members who have responded to our appeal for funds, we are greatly indebted, not alone for the substantial monetary value of their contributions, but also for their faith in the future of the Western Society. We dedicate that future to a continuation and expansion of our service to the profession and the community.

Professional Women's Council To Meet June 8

The next meeting of the Professional Women's Council will be held Wednesday, June 8, in the headquarters of the Society. Beatrice C. Horneman, landscape architect for the Chicago Housing Authority, will speak at 7 p.m. on "Landscape Architecture and Public Housing." A dinner for those wishing to attend will be served at 6 p.m.

List of Contractors

One of the factors in the realization of Chicago's first engineering and science center at 84 E. Randolph Street is the contribution of time and materials of the following contractors. The Society wishes to express its appreciation to each of them.

Acme Venetian Blind Co.
American Seating Company
Anning-Johnson Co., Inc.
Asbestos & Magnesia Materials Co.
Belson Mfg. Co., Inc.
Gus Berthold Electric Co.
Branch-Nicoloff
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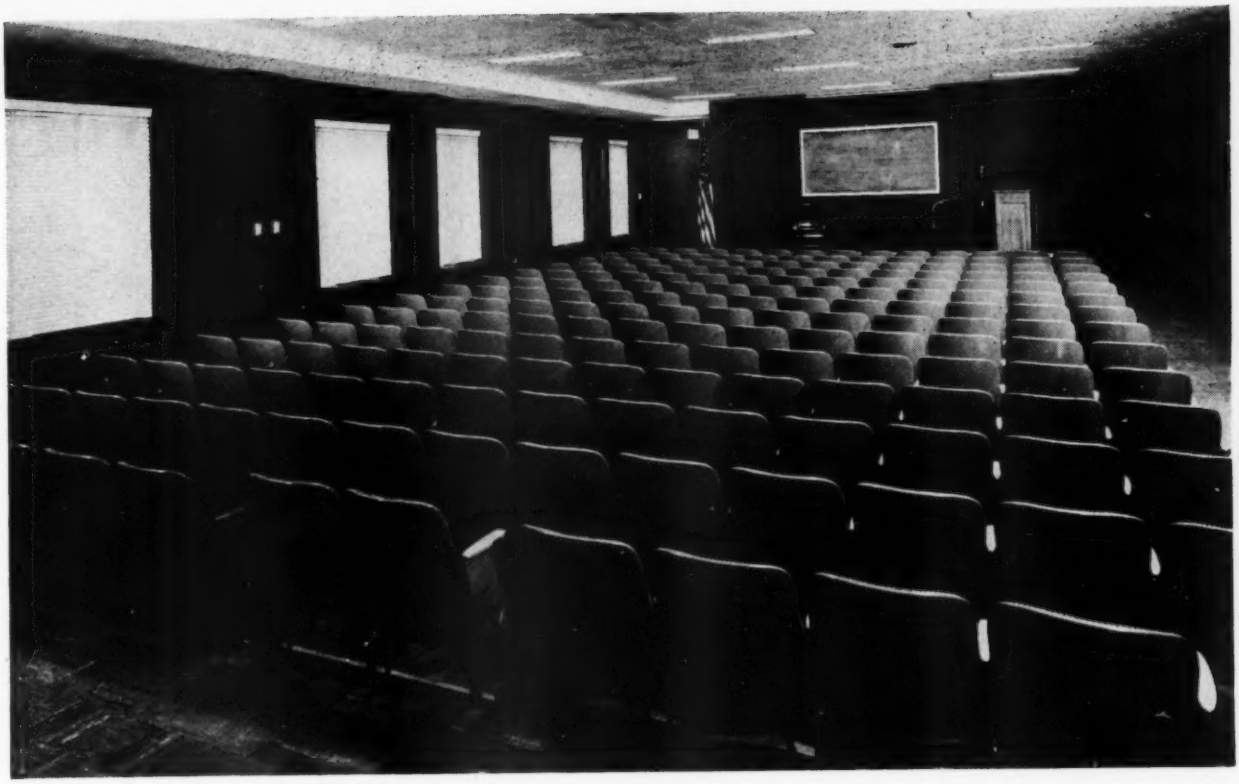
Shick-Johnson Co.
Sam Schuham & Co.
Solar Light Mfg. Co.
Fred Stahl
Trane Co.
Tuttle & Bailey, Inc.
Wade Mfg. Co.
Wadeford Electric Co.
Albert H. Wetten Co.
Ludwig Wilson Co.
The Zack Co.

To WSE Members

The formal commemoration of the 80th Anniversary of the Western Society of Engineers and the dedication of the new headquarters facilities will take place Wednesday, May 25, from 4 to 10 p.m., at 84 E. Randolph Street. The dedication program will begin at 8 p.m.

Buffet dinner will be served in the dining room at $1.60 per person, and the lounge and meeting room facilities will be open for inspection and interesting programs.

In order that we may make adequate provision for the large number expected to attend, will you kindly telephone the WSE headquarters, RAndolph 6—1736 if you plan to attend.



Above, Auditorium

Below, Lounge

Eighty Years of Achievement

Verne O. McClurg

President, Western Society of Engineers

Between the middle and the end of the 19th Century, Chicago enjoyed one of the most remarkable expansions ever experienced by any city. Its population increased more than 30 times, from 30,000 to over 1,000,000. Its business and industrial development multiplied enormously.

The principal factor in this tremendous growth undoubtedly was the development of improved transportation facilities. Although destined to be the crossroads of the nation, Chicago's growth had previously been restricted by its dependence on slow overland and water transportation. However, the famous Illinois and Michigan Canal had scarcely been completed in 1848 when the Galena and the Chicago Union Railroad reached westward some 10 miles. Within the next few years rail communications were established in rapid succession to Toledo, Detroit, Joliet and Rock Island.

A significant date in this railroad expansion was May 10, 1869, when the driving of a golden spike at Promontory Summit marked the initial linking of the east and west coasts by rail. How appropriate that two weeks later, on May 25th, there should be formed in Chicago the organization which has grown to be the Western Society of Engineers of today.

Among the early engineers brought to Chicago by the railroad and industrial expansion was Col. Roswell B. Mason. Formerly Chief Engineer of the New York and New Haven Railroad, he became Engineer-in-Chief of the new Illinois Central Railroad in 1851. Over 700 miles of their road was constructed under his supervision during the next 5 years, and from then until 1869 he was engaged in the construction of various other lines and bridges. On November 2, 1869, Col Mason was elected Mayor of Chicago, serving until 1873. He was Mayor during the great fire of 1871 which destroyed over half of the City, and during the subsequent re-construction period. Upon his death in 1892, the City lost a capable engineer and citizen who was conscious of and did much to implement the sense of civic responsibility of our profession.

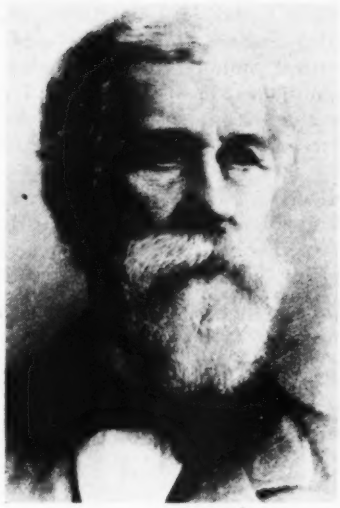
WSE's Large Auditorium at 84 E. Randolph St.

Civil Engineers Organize

On May 25, 1869, at Col. Mason's invitation, 11 other engineers met with him at his office in the Dickey Building on the southeast corner of Dearborn and Lake Streets to form an association of engineers. Strangely enough, this location is within 4 blocks of our present headquarters at 84 E. Randolph St. Since practically all engineers in those days were civil engineers, the new organization was called the Civil Engineers Club of the Northwest. At a second meeting on June 14th, also at Col. Mason's office, a constitution was adopted and 10 additional engineers were enrolled as members. Col. Mason was elected the first president. Upon the expiration of his term he was succeeded by Charles Paine (1870-73), and in turn by Ellis C. Chesbrough (1873-77) and William Sooy Smith (1877-80).

The industrial development which was going on continuously during this period created and called attention to new subdivisions of the engineering profession. In recognition of this broadened sphere, the name of the young organization was changed in 1880 to "The Western Society of Engineers" at which time it was incorporated under the laws of the State of Illinois as a not-for-profit organization.

In establishing the 4th oldest engineering society in the United States, the founders of the Society recognized the need for a professional organization to facilitate the exchange of engineering ideas and the discussion and solution of problems of mutual interest. The constitution they adopted lists the purpose as "the advancement of the theory and practice of engineering, the improve-



Ellis C. Chesbrough

A view of La Salle Street, looking north, about 1885

ment of the status of engineering practice as a profession, and the maintenance of high professional standards." The Society has functioned as an institution of service throughout its history.

As constituted today, the Society provides a forum for the engineering profession. It provides opportunities for broadened personnel contacts with the acknowledged leaders in industry and the profession. It is striving to bring about an increased understanding and recognition among engineers and the public, of the engineer's responsibility in matters of community interest.

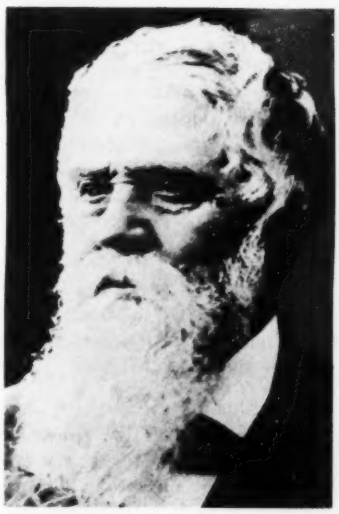
The Society functions through a Board of Direction composed of a President, two past Presidents, two Vice Presidents, a Treasurer and six Trustees elected for non-concurrent three-year terms. It sponsors technical and semi-technical discussions through 10 subdivisions of its membership, in the following fields: electrical; mechanical; communication; transportation; bridge and structural; gas, fuels and combustion; traffic and city planning; chemical and metallurgical; fire protection and safety; hydraulic, sanitary and municipal. Meetings are held weekly except during the summer months. Meetings of a general nature, designed to be of interest to all engineers, are also held monthly during the Society's season.

We are a participating member of the Illinois Engineering Council, an organization of 14 professional groups in Illinois, which considers and acts upon matters of common concern to the engineering and allied technical professions.

We are one of the sponsors of the Engineering Societies Personnel Service, a national non-profit engineering employment service. We participate in the administration of the Washington Award and the Alfred Noble Prize and administer the Charles Ellet Award and the Octave Chanute Medal.

Today we have over 2400 members located in 37 States, the District of Columbia, Hawaii, Puerto Rico, the Virgin Islands, Arabia, Canada, the Philippines and Venezuela. These members are engaged in practically every kind of business requiring engineering talent, representing over 750 individual firms. Our operating budget, which comes principally from annual duties and entrance fees is now in excess of $60,000 per year.

Throughout most of our existence we have published in our "Journal" a large number of the technical papers presented at our meetings. During the past year we began publishing a monthly magazine, MIDWEST ENGINEER, whose objective is the presentation of technical and semi-technical subjects in a simple, understandable manner for members and general readers. The material it contains is intended to make its readers better all-round engineers, rather than specialists in a limited field.



Col. Roswell B. Mason

Technical information is available to our members through our own library of some 25,000 volumes currently stored on the shelves of the John Crerar Library. These titles may be obtained by telephone directly to the office of the Society. The full 55,000 engineering volumes of Crerar Library itself are also available in the quarters of Crerar Library.

(Continued on Page 10)

80 Years of Achievement

(*Continued from Page 9*)

We of Western Society are proud of our place in the community today, but we are no less proud of the rich heritage left by our former members over this 80 year span. As we go on toward the century mark, we will become more and more appreciative of the strong personalities who have preceded us. It would be quite beyond the scope of this article to do justice to this history. If, however, a spark of interest has been kindled by these words, I suggest a review of the comprehensive story of the industrial and engineering development of the Middle West which the Society published in 1944 in commemoration of our 75th anniversary. There you will find reference to such men as these:

Ellis C. Chesbrough (1813-1896) Railroader. Chief Engineer, Boston Water Department 1846. Chief Engineer of Chicago Sewage Commissioners 1855. Planned the original sewage system for Chicago. Chief Engineer, Chicago Board of Public Works 1861. Planned the first two lake tunnels for Chicago's water supply. City Engineer 1863. President WSE 1873-77, 1880-82.

DeWitt C. Creiger (1829-1898). Erected the first municipally owned water works in Chicago. Chief Engineer, North Side Pumping Station (1853-80). City Engineer (1879-81). Commissioner of Public Works 1882-86). Mayor of Chicago (1889-91). President WSE (1883-5).

William Sooy Smith (1830-1916). Civil Engineer and teacher. Designed the first pneumatic caisson in this country. President WSE 1877-80.

Octave Chanute (1832-1910). Extensive railroad and bridge construction. Contributed to the development of the airplane, through more than 2000 glider flights and through consultation with the Wright Brothers. President WSE 1901-02.

Robert W. Hunt (1838-1923). Iron and steel metallurgist. Established first analytical laboratory for steel plants. Founder of Robert W. Hunt and Company. President WSE 1893-4.

Alfred Noble (1844-1914). Extensive bridge construction. Member, Board of Consulting Engineers, Panama Canal 1905. Chief Engineer, construction of East River tunnels for the Pennsylvania Railroad and New York and Long Island Railroad. President WSE 1898-9.

Arthur N. Talbot (1857-1942), Author and teacher. Professor of Municipal and Sanitary Engineering, University of Illinois 1885-1942. Honorary Member WSE 1927.

Ralph Modjeski (1861-1940). Consulting Engineer, extensive bridge construction. Chairman, Board of Consulting Engineers, San Francisco-Oakland Bay Bridge. President WSE 1903-04.

Bion J. Arnold (1861-1942). Consulting Engineer for the first elevated electrical railway, World's Columbia Exposition 1893. Consulting and construction engineer in the field of electrical transportation. President WSE 1906-07.

John W. Alvord (1861-1943). Consulting Engineer, water works and sewer design; public utility valuation. Founder of the Washington Award. President WSE 1910-11.

Advertising List

FILTERED WATER FOR CHICAGO

Clear, sparkling, germ free water is now provided South Side residents by 320 MGD filtration plant embodying many design features developed in experimental filtration plant.

Water Filtration for the South Tunnel District

F. G. Gordon
Assistant City Engineer, City of Chicago

Presented before the Western Society of Engineers, April 11, 1949

Water filtration for Chicago has become available to those of its citizens living south of 39th Street, the area served by the new South District Filtration plant. As a prelude to Mr. Howson's discussion of filtration for the remainder of Chicago you may be interested in some of the background having to do with its construction, its financing, and what we have learned from its operation.

We believe that Chicago has proceeded rather soundly, although at a snail-like pace, in its technical approach to complete filtration of its water supply. John Ericson, former City Engineer, recommended filtration for many years and finally in 1926 secured an appropriation for research on filtration. Arthur E. Gorman, then Chief Sanitary Engineer, was directed to develop the research program. He was successful in securing John R. Baylis, then in charge of the Montebello filtration plant of the City of Baltimore, to conduct the research work. A large scale experimental plant was built in 1927. In addition to many minor investigations, research was carried on in the use of activated carbon to remove tastes and odors. Other studies demonstrated the desirability of surface wash to supplement backwash, the strengthening of coagulation by the use of acid-treated sodium silicate, and the possibility of the use of coarse filter sand for higher filtration rates.

In 1929, the voters approved filtration for Chicago, by a two-thirds majority.

Then in 1933, 1934, 1935, 1936 and 1938, applications were made to the federal government for a loan or grant to construct a plant. The site for the plant moved up and down the shore line between application as follows:

1933, 67th Street; 1934, 79th Street; 1935, 76th Street; 1936 and 1938, Cheltenham Place.

Finally in 1938, under City Engineer Loran D. Gayton, the PWA made a grant for the project and the first bids were received in September of that year.

Although there was opposition to specific locations along the lake front, as may be judged from the shuttling back and forth between applications, at no time was there any serious consideration given to an inland site.

Approval of the lake front site was obtained from the Chicago Park District, the Chicago Plan Commission, the Waterways Division of the State of Illinois and the War Department.

The restrictions imposed by war time priorities not only delayed the construction of the plant but resulted in its being placed in operation piecemeal. The extremely bad condition of the raw water on the south side, which was accentuated by war-time activities in the Calumet industrial district, made it mandatory to start partial operation at the earliest possible moment. In October, 1945, coagulation, sedimentation, and chlorination of the water was begun. The first filters were placed in operation in February of 1947, and the last filters in November of the same year. All water for the south side has been filtered since May, 1947. Carrying on construction and operation at the same time involved no little ingenuity on the part of the engineers, the contractors, and particularly the operating division. My hat is off to all of them.

In general, the plant has functioned as we had hoped it would. Mr. Baylis has been particularly pleased with the high operating rates he has obtained through the filters. The sand for these filters has an effective diameter of between 0.62 and 0.70 millimeters, as against less than .5 millimeters for the conventional filter. Eight of the 80 filters have been operated at a rate of 8 million gallons per day each; four of these 8 units have been stepped up to 9 mgd. each; and two additional units

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CONSUMERS

Water Filtration for the North And Central Tunnel Districts

L. R. Howson
Alvord, Burdick & Howson

Presented before the Western Society of Engineers, April 11, 1949

Mr. Gordon has presented an excellent statement of Chicago's progress to date in the purification of its water supply. In that discussion he has referred to some of the experimental work conducted in connection with the purification program. This work has been of great benefit, not only to Chicago, but to the country at large. Through many excellent papers by such men as Baylis, DeBerard, Gordon, Gayton, Gorman and Gerstein, the results of the Chicago experiments and studies have been generously made available to others.

While it is a worthy accomplishment to have built the world's largest filtration plant, and to have provided a pure, good tasting water for a million and a quarter people, Chicago is confronted by an even greater problem. Two-thirds of the City of Chicago, and many of the adjacent suburbs, are now supplied with Lake Michigan water upon which entire dependence for sanitary quality is placed upon chlorination.

A good water must have three characteristics, viz:

(a) It must be healthful, i.e., it must carry no living germs of disease.

(b) It must be clear and sparkling.

(c) It must be palatable, i.e., free from objectionable tastes and odors.

It is recognized that, while general health conditions in Chicago are good, filtration would provide an added safeguard. The healthfulness of Chicago water is effected only by excessive doses of chlorine which render the water exceedingly objectionable to many people on account of its chlorinous tastes and odors. This is particularly true with respect to visitors. Adequate treatment in a modern filtration plant will obviate the necessity for the excessive quantities of chlorine. Even with the present efficient chlorination procedure, sufficient bacteria escape to cause some doubt as to complete elimination of all disease-producing bacteria, particularly those causing mild intestinal disorders.

From the standpoint of appearance, the Lake Michigan water, without treatment, is comparatively clear much of the time; but as compared to the water served in other cities, it is decidedly dirty at certain seasons of the year when Lake Michigan storms, which stir up the bottom of the lake, are particularly prevalent. Filtration would give clear sparkling water at all times.

The palatability of the Lake Michigan water can also be greatly improved when filtration is practiced. Filtration will make it possible to use activated carbon and other taste control measures which cannot be used without filtration.

Chicago is the last large city on the Great Lakes using unfiltered water. Milwaukee, Detroit, Toledo, Cleveland, Erie, Buffalo, Toronto and Montreal have been supplied with filtered water for many years. All of the cities along Lake Michigan which use the lake as a source of supply, including Sheboygan, South Milwaukee, Racine, Kenosha, Lake Forest, Highland Park, North Chicago, Winnetka, Glencoe, Wilmette, Evanston, Hammond, East Chicago, Whiting, Michigan City, St. Joseph and Grand Rapids, all have filtration of the Lake Michigan supplies. Gary, the last city on Lake Michigan, other than Chicago, without complete filtration, is making plans for a filtration plant at the present time.

The need for filtering all of Chicago's water has long been recognized, and no lengthy discussion is required here. The delay in getting filtered water in Chicago is a demonstration of the saying that "In planning public improvements, ten years hence is the present."

The Chicago water works is divided into three districts, the south district, which has been discussed by Mr. Gordon, and the central and north districts. These three districts have independent intakes and pumping stations and aside from the pipe system operate as three separate water works.

In 1946, the City of Chicago employed the firms of Greeley & Hansen and Alvord, Burdick & Howson to report upon filtration for the central and north districts. Roughly, the central district includes the area from the lake shore westerly between 39th St. on the south and Fullerton Avenue on the north. The north district supplies the area from the lake westerly, from Fullerton Avenue on the south to Evanston on the north. Both districts serve a number of suburbs west and northwest of the city

(*Continued on Page* 16)

Water Filtration For South District

(*Continued from Page* 12)

have operated at a 10 mgd. rate. These are units for which the conventional rating is 4 million gallons per day. The ability of the plant to carry an overload was demonstrated on August 6, 1947, when, with only 70 of the 80 filters in operation, an all-time peak of 541 million gallons per day was reached at 9 p.m. by the three pumping stations supplying the south side. Total pumpage for the day for these stations was 440 million gallons. On this same day the total pumpage for the Central and North District stations was 973 million gallons and the 9 p.m. peak was at 1193 mgd. rate.

August 6th was the third day in succession that temperatures of 100° were recorded. This follows the pattern established in the past, in which the maximum consumption for the year usually takes place on the last day of a hot, dry period. Since the amount of water which must be filtered affects both the first cost and the operating costs of filtration plants, it seems proper to discuss briefly the use of water in Chicago. There is a rather general opinion that, because Chicago has a high per capita consumption, there must be an enormous waste of water. Twenty years ago there were grounds for this belief. However, in 1932, the Water Pipe Extension Division started an intensive and unremitting drive on leakage and waste with spectacular results. These can best be illustrated by the following table which shows the average daily pumpage; number of services, metered and non-metered; average daily metered consumption; and the difference between total pumpage and metered consumption, which difference includes leakage, street usage, free water, and non-metered consumption. Figures are for the year 1932, and the years 1939 to 1948 inclusive.

Water Consumption in Chicago

Year	*Services*		*Ave. Daily Pumpage & Consumption*		
	Metered	*Assessed*	*Pumpage Million Gallons*	*Metered Consumption MG.*	*Non-Metered Consumption, Leakage & Waste MG.*
1932	109,174	313,469	1,009	326	683
1939	115,025	297,203	965	390	575
1040	115,174	299,260	964	393	571
1941	115,332	299,899	977	432	545
1942	114,769	301,880	956	425	531
1943	115,070	302,370	976	447	529
1944	115,469	303,444	977	468	509
1945	115,016	305,381	964	474	490
1946	115,672	306,563	972	485	487
1947	116,190	308,631	980	511	469
1948	118,531	311,825	972	523*	449*

* *Preliminary Figure*

Analysis

The foregoing figures are highly significant. Note that the non-metered consumption was more than twice the metered consumption in 1932, but in 1947 and 1948 it was actually less than the metered consumption. Note, also, that the total pumpage is less, despite the tremendous gains in the metered consumption. Since the number of assessed rate services is substantially the same as it was in 1932, and since the number of assessed rate consumers and their legitimate usage of water has increased, it is obvious that the very large reduction in non-metered water is due to the elimination of leakage and waste.

After making reasonable allowances for street usage, underground leakage, and free water to municipal, religious, educational, charitable, state and county buildings, it is probable that the present consumption of the assessed rate group falls within limits of 270 to 330 million gallons per day. This is equivalent to a per capita consumption of 135 to 165 gallons per day for the estimated 2,000,000 assessed rate consumers, and compares with a 235 gallons per capita per day consumption for all consumers.

While the reduction in non-metered water has proceeded most gratifyingly year after year, the foregoing per capita figures indicate that such reductions must be approaching the end point. However, without regard to future reductions, it is apparent that Chicago has gone a long way in checking leakage and waste, and that her high per capita consumption is, today, the result of high metered consumption, and not of profligate waste.

One of the disturbing features of winter operation of plants taking their water from the Great Lakes is the possibility of interruption of supply by the formation of anchor or frazil ice in intake structures. The South District plant has had its full share of ice troubles. During the first two winters of operation the tunnel connection to the crib intake had not been completed and all water was obtained through the shore intake. At periods during January, February, and even March, trouble was experienced with ice forming in the

(*Continued on Page* 44)

Filtration for North And Central Districts

(*Continued from Page* 13)

limits under the provisions of the sanitary district act of 1889 by which Chicago is obligated to supply water to suburbs within the district and desiring it, who extend their mains to a connection with the Chicago mains.

Population To Be Provided For

Since water requirements are, in general, a reflection of population growth, the first step in an investigation of this kind is a study of the population growth and a forecast of the population to be served within the next 20 or 25 years. Many agencies at Chicago have studied this problem, and the consulting engineers had the benefit of the data and estimates made by the Chicago Plan Commission, the Chicago Regional Planning Association, the Water Pipe Extension Division of the City of Chicago, and others.

For more than 50 years prior to 1930, the City of Chicago gained more than a half million people per decade. The gain in the 1930-40 decade was less than any decade in the prior 100 years.

From the population studies it was concluded that provision should be made for the year 1970 for 1,140,000 people in the north district, 1,830,000 people to be supplied from the central district. This includes both Chicago and suburban populations.

Pumpage

Chicago had a very rapid growth in water requirements until about 1930. For several decades Chicago has pumped more water than any city in the world, a fact which was once prominently displayed on billboards throughout the city

The average pumpage trebled between the years 1900 and 1928, since which time there has been no increase. In fact, since 1936 there has been a slight decrease. This is a fine showing in view of the fact that during this period there has been a marked increase in industrial use occasioned by heavy industry during the war. For the past twelve years there has been a continuing greater percentage of pumpage sold and revenue produced. This is true even though during this period the percentage of services metered remained substantially constant. This fine accomplishment has been the result of especially effective inspection to prevent leakage and water waste by flat rate consumers.

Maximum Pumpage

Since it is the maximum day's use which a water supply must be able to meet, a study was made to ascertain the relationship between average and maximum day's pumpage on the Chicago water works.

Future Maximum Pumpages

At present only approximately 28% of Chicago's services are metered, and about one-half of the recorded pumpage is sold through meters. As much as 15% of pumpage is generally regarded as a reasonable difference between the water pumped and the water delivered to consumers in a completely metered system. Roughly, therefore, pumpage reduction through the installation of meters on remaining services at Chicago would have to be obtained through economies in substantially 35% of the present pumpage.

Looking at the future from all points of view, it was the consultant's conclusion that filtration plants to be built in the near future should have sufficient capacity to supply 1,560 million gallons per day to meet the maximum requirements of the entire city of about the year 1970. On this total 950 million gallons per day will be distributed in the areas now without filtration, 320 MGD in the north district and 630 MGD in the central district.

(*Continued on Page* 45)

CHICAGO

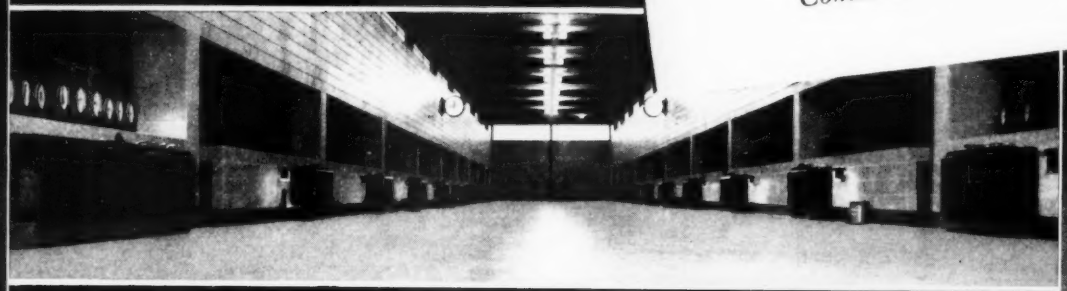
South District Filtration Plant

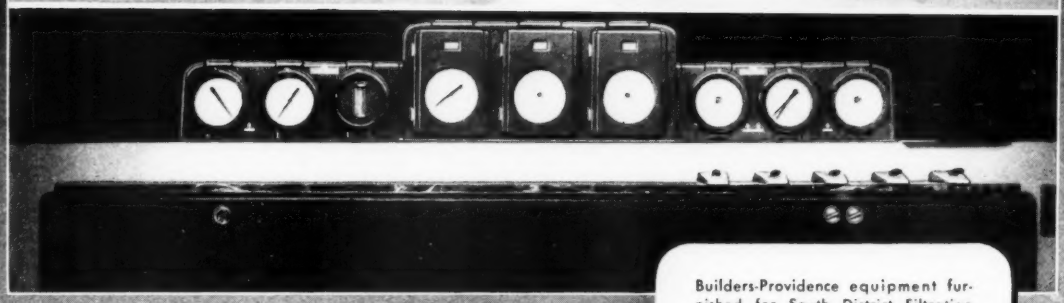
(Completed in 1947)

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING
W. W. DeBERARD, City Engineer

ALVORD, BURDICK & HOWSON
Consultants

GREELEY & HANSEN
Consultants





Builders-Providence equipment furnished for South District Filtration Plant:

- 80 20" Venturi Rate of Flow Controllers
- 76 3-dial Filter Gauges (Sand Expansion, Loss of Head, Rate of Flow)
- 160 Pneumatic Transmitters
- 4 Master Filter Gauges
- 4 20-unit Pneumatic Summators
- 2 2-unit Pneumatic Summators
- 10 30" Double Dial Illuminated Gauges
- 4 30" Back Wash Venturi Controllers with Pneumatic Transmitters and Recorders
- 4 16" Surface Wash Venturi Tubes with Pneumatic Transmitters and Recorders

Illustration shows Builders Master Gauge and Operating Table.

Chicago's new South District Filtration Plant, the largest in the world, supplies filtered water to over 1,500,000 people in Chicago and its suburbs. *Builders-Providence filter equipment* was installed in this giant plant by *Pitt Construction Company*. For Bulletins describing Builders waterworks equipment, address Builders-Providence, Inc., (Division of Builders Iron Foundry), Providence 1, R. I.

BUILDERS PROVIDENCE
Instruments

Filtration for Chicago—Another View

John W. Root
Chairman, Planning Committee
Chicago Plan Commission

Ed. Note:

The location of the proposed filtration plant for the north and central districts is an important one both from engineering and city planning standpoints. The preceding paper by Mr. Howson gives one viewpoint. So that our membership may be as fully informed as possible on this much discussed question, another viewpoint is presented in the following paper prepared by Mr. Root.

The proposed filtration plant for the Central and North Districts should, in the opinion of the Chicago Plan Commission, be located on an inland site in a blighted area rather than on the lake front near the central part of the city.

The Plan Commission is concerned with the relationships between proposed improvements and the future development of the city. It must analyze the impact of the plant on the neighborhood, on the city, and on the city's future. It must weigh the advantages and disadvantages of each site and attempt to gauge the significance of the site in these terms.

The lake front has been recaptured from the railroads, the sewers, and the lake itself, with patience and determination at a cost of hundreds of millions of dollars. It has been turned into boulevards, parks, bathing beaches, and museum sites. It is now Chicago's greatest physical asset, and must be protected.

An inspection of the lake fronts of Cleveland, Buffalo, Detroit, Milwaukee, and Sandusky, Ohio) demonstrates how these cities have turned their backs to their water fronts. They now realize this fact, and are doing everything possible to regain this valuable asset. They all point to Chicago as the city that has done the most with its lake front.

If the site recommended by the consulting engineers north of Navy Pier were developed, it would, the Plan Commission believes, prove in the long run to be unharmonious with other nearby shore-line improvements.

Even with fine architectural treatment, the principal building would of necessity be large, and incompatible with the lake front park and recreational development in the vicinity. The most elaborate landscape treatment would not conceal this fact.

It is sometimes stated that the South Side filtration plant with its lake front location at the foot of Seventy-ninth Street established a precedent. But the Plan Commission points out that the South Side plant forms a buffer or transitional use between the heavy industrial developments of the steel and other industries of the Calumet district to the south, and the continuous lake front park development to the north.

Furthermore, the South Side plant, although on the lake front, is not located in an intensively developed area, with its high land values, as would be the proposed plant were it located near Navy Pier. The attractive landscaping and beach development of the South Side plant containing as it does added acreage for bathing and other recreational uses, is an asset to the residential areas nearby. In contrast, additional park development on the central lake front would not be needed or used in the same degree by the dwellers of the large apartment buildings in the vicinity, as would be true at either the South Side or proposed inland location. Because of its location within the breakwaters, bathing facilities would not be feasible at the Navy Pier site.

Of the three sites submitted to the Plan Commission, the Commission prefers a 55-acre portion of the blighted area on the North Side, bounded by Division, Orleans, Oak, and Crosby Streets. Land use within the site is chiefly blighted residential, with a small amount of commercial and industrial property. It is located near the existing Chicago Avenue tunnel and would involve additional underground construction not excessively great in comparison with the proposed central lake front site. Its additional cost, estimated at perhaps eight million dollars, would be, in the opinion of the Plan Commission, more than offset by additional advantages.

It is the belief of the Plan Commission that there are not enough public or private sources of money in prospect to clear the vast blighted areas of the city. The Plan Commission believes that to eliminate these centers of poverty, disease, and crime, every project that can be made to contribute to such elimination should be planned to do so.

Tax revenue collected within the blighted-area site, quoted as $73,185 per year, is insufficient to cover the costs of essential public services and facilities for the area.

Expansion of the site south of Oak Street might be possible following the termination of the useful life of the Cabrini Housing Project structures. The need for the expansion of the filtration plant would probably not occur before that time, and ultimate single public ownership of the housing project would

(*Continued on Page* 39)

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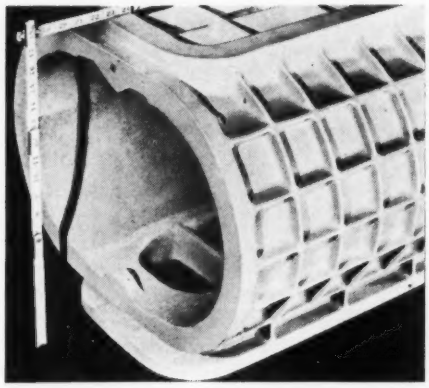

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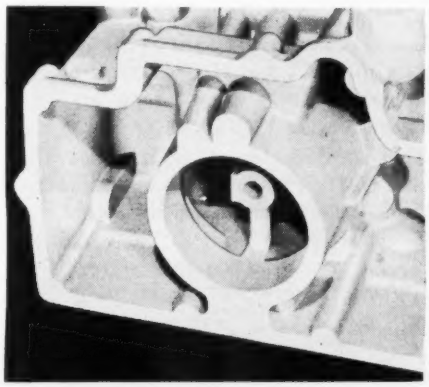

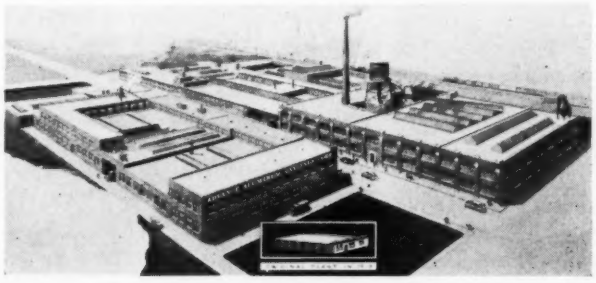

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Gustav Egloff

H. P. Sedwick

J. C. Witt

Announce WSE Officers for 1949-50

Officers of Western Society of Engineers for the year 1949-50 have been announced by the Board of Direction, following the annual election.

Letter ballots returned by members were counted by the Judges of Election on April 26.

Gustav Egloff (M'36), a former trustee of WSE, was elected President for the coming year. He was First Vice-President during 1948-49.

First Vice-President will be H. P. Sedwick (A'23), who served this year as Second Vice-President, and is also a former trustee.

Second Vice President will be J. C. Witt (M'36).

Donald N. Becker (M'20), who was chosen by the Board of Direction in November to fill the unexpired term of M. P. Vore, Jr., as Treasurer, was elected Treasurer for 1949-50.

New Trustees, elected to serve for three years, are Leroy F. Bernhard (J'30, A'36, M'46), and Ludwig Skog (M'26). In addition, the following trustees will continue to serve: Chas. E. DeLeuw (J'13, M'21), and Eldon A. Imhoff (M'40), one year; Wilfred Sykes (M'36), and Fred T. Whiting (M'45), two years.

Verne O. McClurg (M'31), and J. T. Rettaliata (M'48), will serve as members of the Washington Award Commission for three years.

Gustav Egloff

Dr. Gustav Egloff has been Petroleum Technologist for Universal Oil Products Company since 1944, and was Director of Research for the same firm from 1917 to 1944. His earlier positions included a year with the U. S. Bureau of Mines, 1915-16, and a year with the Aetna Chemical Co., Pittsburgh.

He was graduated from Cornell University in 1912, received an M.A. degree from Columbia University in 1913, and a Ph.D. degree from Columbia in 1916.

Among the scientific societies of which he is a member, are: American Institute of Chemical Engineers, American Society of Mechanical Engineers, American Society for Testing Materials, American Institute of Mining and Metallurgical Engineers, American Institute of Chemists, American Association for the Advancement of Science, National Aeronautical Association of U. S. A.

In 1940, Dr. Egloff received the Octave Chanute Medal of WSE, as well as the Gold Medal of the American Institute of Chemists. He was named one of the "Modern Pioneers" by the National Association of Manufacturers in 1940 and received Columbia University's Medal for Excellence in 1943. The National Research Council awarded him its Distinguished Service Award in 1941.

Dr. Egloff has received the honorary Doctor of Science degree from three schools, Polytechnic Institute of Brooklyn, 1938; Armour Institute of Technology, 1940; Philadelphia College of Pharmacy and Science, 1944. He received the Grande Diploma, Instituto Technico Industrial, Rio de Janeiro, Brazil, 1938.

He joined the Western Society of Engineers in 1936, and was a director of the Chemical and Metallurgical Engineering section 1936-39, serving as chairman from 1937 to 1939. His committee service has included the Library, Program, Cooperative Relations, Attendance, and Development Committees. He was elected a Trustee in 1944.

H. P. Sedwick

H. P. Sedwick has been associated with Public Service Company of Northern Illinois since 1913. He served in various engineering and operating capacities until 1941, when he became a Vice-President of that company.

He joined the Western Society of Engineers in 1923. He served as a member of the Executive Committee of the Gas, Fuels and Combustion Engineering Section from 1945 to 1948, and was Chairman of the Management Committee, 1946-47. He was Chairman of the Development Committee for the year 1947-48; Co-Chairman of this Committee for the year 1948-49; a Trustee of the Society, 1945-47; and Second Vice-President for the year 1948-49.

J. C. Witt

J. C. Witt's first studies were in science, leading to a Ph.D. degree in chemistry and physics, at the Univer-

sity of Pittsburgh. Later he received his M.E. degree at Armour Institute of Technology. Most of his professional experience has been in connection with the manufacture and use of Portland cement. Starting as technical director of the Rizal Cement Company in the Philippine Islands, he was director of research for Universal Atlas Cement Company for a number of years, and then technical director for Marquette Cement Manufacturing Company for ten years. He is now a consulting engineer.

Mr. Witt is a fellow of the American Society of Mechanical Engineers, and a member of the American Society of Civil Engineers, and other scientific and engineering societies. He is the author of "Portland Cement Technology."

Becoming a Member of the Western Society of Engineers in 1936, he is affiliated with the Chemical and Metallurgical; Gas, Fuels, and Combustion; and Mechanical Engineering Sections; and the Consulting Engineers' Division. For five years he served as a Director of the Executive Committee of the Chemical and Metallurgical Engineering Section, including two years as Chairman. He has served on the following committees: Program (Chairman), Awards, Civic, Publications, Admissions, Fellowship.

Donald N. Becker

Donald N. Becker is chief structural engineer with A. J. Boynton and Co. From 1924 until 1948 when he joined the Boynton firm, he was Engineer of Bridge Design with the Division of Bridges and Viaducts, City of Chicago.

Mr. Becker has been a member of the Society since 1920. He was a member of the Library Committee during the years 1935-37, and was active on the Bridge and Structural Section from 1935 to 1940. He served as a Trustee from 1944 to 1946.

Ludwig Skog

Ludwig Skog is Senior Partner, Sargent & Lundy, consulting engineers in steam electric power plant design. He joined Sargent & Lundy in 1910 as a draftsman, progressing to Director and Chief Mechanical Engineer in 1932. He became Vice-President and Chief Engineer in 1938, Partner and Chief Engineer in 1940, and Senior Partner in 1947.

He serves as consultant on navy power plant design, studied power plant engineering in European countries in 1938, and from 1943 to 1946 was engineer in charge of design and construction for power development and mechanical process engineering for the Oak Ridge Gaseous Diffusion Plant.

He is a Director of Illinois Institute of Technology, and a graduate in Mechanical Engineering of the Trondheim Polytechnic Institute, Norway.

Mr. Skog joined Western Society in 1926, and is registered in the Consulting Engineers Division and the Mechanical Engineering Section.

L. F. Bernhard

L. F. Bernhard has been with Illinois Bell Telephone Company since 1929 in various capacities in the engineering departments. At present he is Cost Studies Engineer handling problems of economic selection.

He was graduated from Armour Institute of Technology in 1929 with a B.S. in Electrical Engineering.

Mr. Bernhard joined Western Society as a Junior Member in 1930, became an Associate Member in 1936, and a Member in 1946.

Among his committee assignments were the Chairmanship of the Excursion Committee, 1945-47, and the Chairmanship of the Publications Committee during 1948-49, when he was instrumental in the introduction of MIDWEST ENGINEER.

J. T. Rettaliata

Dr. John T. Rettaliata, director of the Department of Mechanical Engineering at Illinois Institute of Technology, will become Dean of Engineering on September 1.

After receiving his Bachelor's degree in 1932 and his Doctor's degree in 1936 from Johns Hopkins University, he joined Allis-Chalmers Company where he was named manager of gas turbine development and research, a position he held until he joined Illinois Tech.

Among honors he has received are: fellowship of the National Academy of Science in 1940 for gas turbine study, Junior Award of the ASME in 1942 for a paper, "Combustion Gas Turbine;" and in 1943, the Pi Tau Sigma gold medal award for outstanding achievement.

During World War II, he twice visited the European theater to study jet pro-

(*Continued from Page* 24)

Donald N. Becker

Ludwig Skog

L. F. Bernhard

WSE To Present Service Award

A Service Award, to be presented to Western Society members for outstanding work affecting the Society, has been approved by the Board of Direction.

The Awards and Membership Committees of the Society had recommended its establishment.

The award will be presented for activity in bringing in new members, for outstanding section and division development work, for outstanding committee work, or for a paper accepted for publication in MIDWEST ENGINEER, submitted by a member but not presented at a Society meeting.

Candidates for the award will be recommended by the Awards Committee, and considered by the Board of Direction at its regular April meeting each year.

Presentation of the award, in the form of a certificate signed by the President and Secretary of the Society, will be made at the Annual Meeting in June. The award will be limited to ten recipients each year.

Members are urged to send in to the President their suggestions as to qualified candidates.

P.R.A. Construction Cost Index Shows Drop

For the first time since 1940, the quarterly index of highway construction costs compiled by Public Roads Administration showed a decline in contract prices during the first three months of this year. The index, based upon 1940 prices, dropped from 223.5 per cent of the 1940 average to 219.2 per cent.

JUNE DINNER

Featuring Colonel Jack Major, Nationally Known Humorist To Be Held June 6 at 5:30

Western Society's annual June dinner, to be held June 6 in the Furniture Club of America, will feature Colonel Jack Major, "the Kentucky colonel," speaking on the subject, "Taxes, Women and Hogs."

The program will open with a social hour at 5:30 p.m., and dinner will begin at 7 p.m. Tickets will be $3.85.

Colonel Major's reputation as "the man who makes people laugh" began when he was a small boy in Paducah, Kentucky, the town that produced Irvin S. Cobb. There he spent long hours with Cobb, caddying for him when he played golf, and drinking in the droll stories and humorous comments that were Cobb's trademark.

Most boys wanted to be a policeman or engineer—but Jack Major wanted to be like Cobb, and he took to heart the suggestion of the humorist that he make a practice of noting everything he might see or hear that made people laugh.

After a boyhood that featured such various ventures as a paper route, bicycle shop, lawn cutting service, and garage constructing business, he worked his way through Rice Institute in Houston, Texas. Summers he sailed as an ordinary seaman, bringing back tales of the seven seas.

At Rice his entertainment abilities were discovered. He organized the Glee Club, wrote college shows, and finally won vaudeville's attention. He became tenor soloist with Isham Jones' orchestra, and made recordings for Columbia and Brunswick. But it wasn't long before he learned that, although people liked to see good dancers and hear good singers, they preferred to laugh . . . and here his training with Cobb began to show.

From 1928-34 Major toured the nation as a singer-comedian, breaking into radio in 1935. After a year in San Francisco with his own show, he began doing shows for all three networks, including a coast-to-coast show called "The Colonel from Kentucky." It was this show that introduced him to Washington, D.C. Vice President John Nance Garner heard it in 1937 in Texas, and invited Jack Major to speak at a dinner in Washington, given in honor of President Roosevelt.

He was popular with such Washington figures as Jesse Jones, Sam Rayburn, and Alben Barkley, and finally was forced to give up radio, and become a full-time after-dinner speaker.

In 1939 he toured Australia, and on his return, worked in association with several firms, visiting industrial groups as an entertainer, and finally managing the speakers' bureau of the National Association of Manufacturers.

Then came the war, and Colonel Major was asked to aid in entertaining servicemen. In March, 1943, he left for the South Pacific.

Upon his return, he filled lecture engagements with his talk, "Jeeps, Japs, and Jests," based on his South Pacific experiences, and then settled down on his farm near Paducah.

Today Colonel Major lectures during the fall, winter and spring months, and spends the summer on his farm, raising hogs and selling hickory smoked hams and sausage.

To the Secretary,
Western Society of Engineers, 84 E. Randolph Street, Chicago 6.

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Tickets $3.85 per person. Including tax and gratuities.

Separate tables assigned for 10 tickets.

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Officers

Of WSE Sections And Divisions Announced

Executive Committees of WSE sections have been elected during the past month at the final meetings of the various sections.

To serve for one year, beginning June 1, 1949, the officers are elected under Rule 8 of "Rules for the Organization, Management and Operation of Engineering Sections."

Bridge and Structural

Officers of the Bridge and Structural Engineering Section will be as follows: Chairman, Albert P. Boysen; Vice Chairman and Program Committee, Edward J. Slygh; Publications Committee, A. R. Mitchell; Attendance Committee, W. B. Gray; Fellowship Committee, Gunni Jeppesen; Membership Committee, L. E. Grinter.

Chemical and Metallurgical

Chairman of the Chemical and Metallurgical Engineering Section will be Harry P. Hagedorn. Other officers will be: Vice Chairman, L. F. Dobry; Program Committee, Walter E. Ballinger; Publications Committee, Clarence Greasley; Fellowship Committee, J. C. Witt; Membership Committee, Otto Zmeskal.

Electrical Engineering

V. E. McCallum will be Chairman of the Electrical Engineering Section for the coming year. Vice Chairman will be William J. Behrens; Program Committee, George S. Hall; Publications Committee, Harold J. McCreary; Fellowship Committee, V. S. Acton; Membership Committee, W. B. Ferguson.

Hydraulic, Sanitary and Municipal

Chairman of the Hydraulic, Sanitary and Municipal Engineering Section will be Harry Lagerstrom. Vice Chairman and Program Committee, will be L. E. Langdon; Publications Committee, Peter Page; Attendance Committee, George D. Hardin; Fellowship Committee, Harry Bartz; Membership Committee, Albert L. Tholin.

Mechanical Engineering

Officers of the Mechanical Engineering Section will be Chairman, Harry A. Erickson; Vice Chairman, Rex E. Hieronymus; Program Committee, W. P. Strickland, Jr.; Publications Committee, George N. Simpson; Attendance and Fellowship Committees, Jay C. Marshall; Membership Committee, Percy Sawyer.

Traffic Engineering and City Planning

Chairman of the Traffic Engineering and City Planning Section will be Victor G. Hofer. Other officers will be: Vice Chairman and Attendance Committee, William R. Marston; Program Committee, H. Evert Kincaid; Publications Committee, Walter E. Rasmus; Fellowship Committee, Raymond W. Hazekamp; Membership Committee, Reginald N. Wade.

Professional Women

Chairman of the Professional Women's Council will be Mary L. Murphy of Illinois Bell Telephone Co.; Vice Chairman, Beatrice C. Horneman of Chicago Housing Authority; and Secretary, Mrs. E. Frances Barnett of the City of Chicago. Board members elected for one term are Iris Ashwell of Chicago Housing Authority, and Mrs. Dot Merrill of Merrill & Company; elected for two years is Georgiana Peeney of Lansing B. Warner, Inc.

Announce Officers

(*Continued from Page* 21)

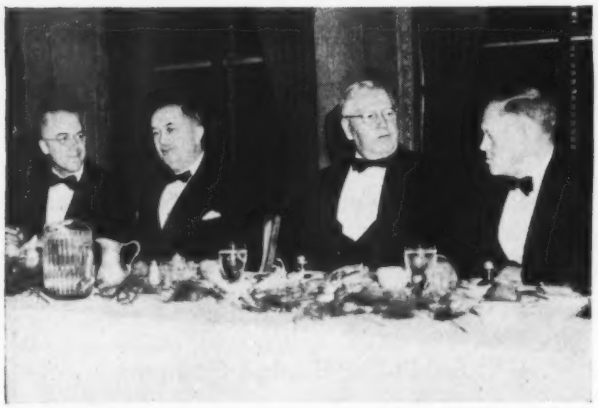
pulsion and steam turbine developments.

He is a member of the American Society of Mechanical Engineers (chairman of the gas turbine division), and the American Society of Naval Engineers.

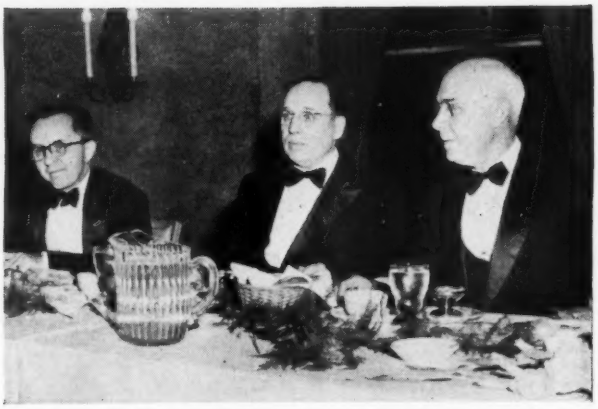
Verne O. McClurg

WSE President for the past year, Verne O. McClurg is a partner in the architectural and engineering firm of Mundie, Jensen & McClurg. From 1923 until 1945 he was associated with the firm of Holabird & Root & Burgee (then Holabird & Roche) as structural engineer. He graduated from the University of Colorado in 1911, with a B.S. degree in Civil Engineering, and for the following twelve years was engaged in the planning and supervision of construction with American Bridge Company, Illinois Central Railroad, and several other organizations.

Mr. McClurg became a member of the Western Society of Engineers in 1931. He served as a Director on the Executive Committee of the Bridge and Structural Engineering Section, 1935-38, and was Chairman in 1936-37. His other committee service has included the Admissions, Program, Finance, and Development Committees. He was a Trustee of the Society from 1942 to 1945, and served as Second Vice-President, 1946-47, and First Vice-President 1947-48.



Speakers' Table: T. G. LeClair, C. H. Mottier, Wilfred Sykes, Forrest Nagler



Speakers' Table: F. D. Troxel, V. O. McClurg, John Lucian Savage

PRESENTING TO JOHN LUCIAN SAVAGE

The Washington Award for 1949

Guests at the 1949 Washington Award Dinner, held April 20 at the Furniture Club of America, saw John Lucian Savage, internationally recognized hydraulic engineer, receive the award for "unselfish public service devoted to the creation of monumental hydraulic structures utilizing natural resources."

Titus G. LeClair, Chairman of the Washington Award Commission, serving as toastmaster for the occasion, emphasized that the meeting represented "societies whose total membership is well over 50,000 and it is the award which is administered by the largest group of engineering societies in this country."

After describing the award and the work of the Washington Award Commission which administers it, LeClair introduced the Commission members, including F. W. Thompson, American Association of Electrical Engineers, Verne O. McClurg, Western Society of Engineers, Forrest Nagler, American Society of Mechanical Engineers, Wilfred Sykes, American Institute of Mining and Metallurgical Engineers, and C. H. Mottier, American Society of Civil Engineers. Mottier acted as spokeman for the group and expressed their "deep interest in the award" and "wholehearted endorsement of the selection of Mr. Savage as recipient of this year's award."

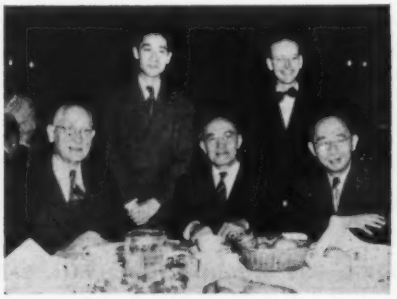
In explaining the choice of Savage to receive the award, LeClair stated that "he has been responsible for more than 300 major projects in the building of dams and in the construction of reclamation and power plant projects, as a consulting engineer and as Chief Designing Engineer for the U.S. Reclamation Service. Among the dams with which most of us are familiar are the Hoover Dam on the Colorado River, the Norris and Wheeler Dams and the Grand Coulee."

Since 1945, Mr. Savage has spent most of his time as "consultant on hydro projects for foreign governments, as he was unquestionably the man with the greatest international reputation and skill in that form of work," LeClair continued.

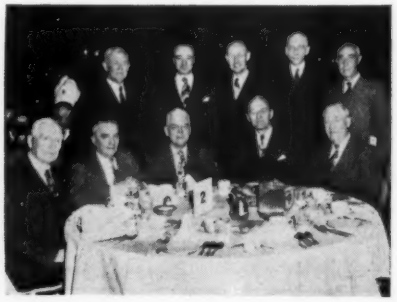
The award was presented to Savage by WSE President McClurg with these words, "Dr. Savage, the Board of Direction of the Western Society of Engineers was most pleased to approve the recommendation of the Commission that you be presented the Washington Award for 1949. They also feel that your accomplishments have been such that your name should be added to the list of distinguished past recipients.

"So that all gathered here tonight to do you honor may know what is inscribed upon this token award, I will read to them the words of citation . . . Dr. Savage, it is my honor and privilege to present to you this token of the Washington Award for 1949."

Seated: Mesdames John F. Calvert, F. D. Troxel, V. O. McClurg, C. H. Mottier, O. W. Eshbash.
Standing: Carl W. Muhlenbruch, John F. Calvert, Wm. C. Knopf, O. W. Eshbach, Mrs. T. G. LeClair.



Seated: W. W. DeBerard, Gustav Egloff, J. T. Wang.
Standing: Y. Y. Yu, Charles T. Craig.



Seated: Harry B. Gear, Victor H. Jones, Percy Sawyer, M. O. Withey, Charles L. Byron.
Standing: L. B. Robertson, T. S. McEwan, E. Gordon Fox, J. DeN. Macomb, Rowland Anthony.

How the Award Originated

Perhaps the most appreciated and gracious action of the Western Society of Engineers is the presentation of the Washington Award conferred each year upon some engineer for "preeminent services in promoting the public welfare." Each presentation is featured by a dinner in honor of the recipient attended by more than 500 engineers and guests. As the field covered by recipients is nation-wide without restriction as to engineering or scientific specialty, this recognition has been most highly appreciated by the recipients; and on the principle that it is more blessed to give than to receive, the audience comes away with a feeling of inward satisfaction.

This prize, founded and endowed in 1916 by John W. Alvord, Hon. M. WSE, is administered by a commission consisting of nine members of the Western Society of Engineers and two members each appointed by the four National Founder Societies covering the civil, mechanical, electrical and mining fields. No one may receive the award until after a full year of consideration by the commission. Names for consideration may be formally suggested by any of the seventeen commission members, or by others if accompanied by a written statement in specified form. Commission members have overlapping terms so that continuity of purpose may be maintained.

Mr. Alvord, in his letter to the Board of Direction under which the award was founded, called attention to the fact that great benefits often accrue to the public through the work of engineers who have worked without personal reward or gain. He pointed out that some engineers may be substantially rewarded in a material way, but, nevertheless, have accomplished so much for the world about them that they are deserving of further special honor; and, that it is not always perceived that almost all engineers serve the public directly or indirectly. His letter closed with this paragraph:

> "Being desirous of promoting a better appreciation by the public of able work accomplished by engineers for the public welfare, and, further, of encouraging among engineers themselves a broader understanding of their opportunities for public usefulness, I desire to see established by The Western Society of Engineers an honor award, by medal or other tribute, to be annually presented to that engineer whose particular work in some special instance or whose services in general have been noteworthy for their merit in promoting the public good."

John Lucian Savage (center) receiving the Washington Award from Titus G. LeClair (left), chairman of the Commission, and Verne O. McClurg (right), President of the Western Society of Engineers.

In past years awards have been made to the following:

1919—Herbert C. Hoover, Hon. M. WSE, for his work as food administrator.

1922—Robert W. Hunt, Hon. M. WSE, pioneer work in the steel industry.

1924—Arthur N. Talbot, Hon. M. WSE, life work as a teacher and investigator.

1925—Jonas Waldo Smith, technical skill as an engineer and leader.

1926—John Watson Alvord, Past Pres. and Hon. M. WSE, public utility valuation and sanitary science.

1927—Orville Wright, research and successful airplane flight.

1928—Michael Idvorsky Pupin, scientific research.

(*Continued on Page* 28)

T. G. LeClair, Chairman of the Washington Award Commission.

How the Award Originated

(*Continued from Page* 27)

1929—Bion Joseph Arnold, Past Pres. and Hon. M. WSE, pioneer work in electrical transportation.

1930—Mortimer Elwyn Cooley, for leadership in engineering education.

1931—Ralph Modjeski, Past Pres. and Hon. M. WSE, superior skill in bridge design.

1932—William David Coolidge, ductile tungsten filaments and modern X-ray tube.

1935—Ambrose Swasey, builder of precision instruments.

1936—Charles Franklin Kettering, industrial research for better automobiles.

1937—Frederick Gardner Cottrell, research in science and engineering.

1938—Frank Baldwin Jewett, progress in communication.

1939—Daniel Webster Mead, Hon. M. WSE, engineer and teacher.

1940—Daniel Cowan Jackling, M. WSE, large scale treatment of low-grade copper ores.

1941—Ralph Budd, M. WSE, leadership in high speed railroad transportation.

1942—William Lamont Abbott, Past Pres. and Hon. M. WSE, coal combustion development and research.

1943—Andrey Abraham Potter, mobilizing technical knowledge for war and peace.

1944—Henry Ford, mass production of low cost automotive transportation.

1945—Arthur Holly Compton, Hon. M. WSE, teaching and research in X-rays and cosmic rays.

L. R. Howson (left) and Chas. B. Burdick of Alvord, Burdick & Howson. Both are members of the Washington Award Commission. John W. Alvord founded the Award.

1946—Vannevar Bush, organization of scientific resources for war.

1947—Karl Taylor Compton, education for leadership in the technology of industry.

1948—Ralph Edward Flanders, skill in tools of industry and in the field of human relationships.

Necrology

Charles F. Hall, Bridge Design Engineer for the City of Chicago, died March 28. He was in charge of the design of mechanical equipment for Chicago's movable bridges.

Mr. Hall was a member of Western Society from 1916 to May, 1923, and reinstated his membership on October, 1945.

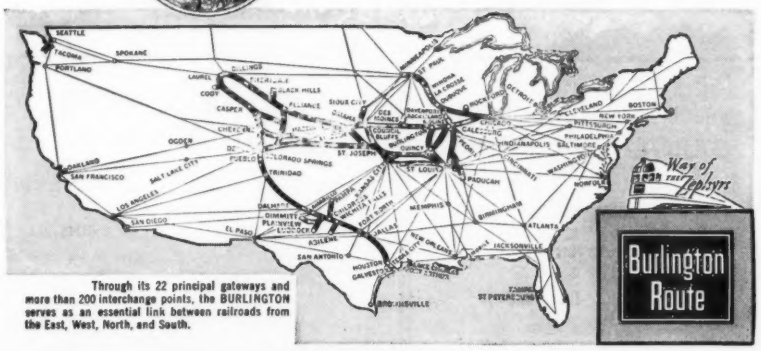
He was 79 years old at the time of his death.

John Lucian Savage

BURLINGTON'S 100th ANNIVERSARY

● One hundred years ago, a little group of foresighted men obtained a charter for the twelve-mile Aurora Branch Railroad. From that humble beginning (on February 12, 1849) has grown the present Burlington system—11,000 miles of railroad, serving fourteen great states. Rich in the pioneering tradition, the Burlington has contributed many important innovations in railroading . . . from the first railway post office (1862) to America's first diesel-powered, streamlined train (1934) and the first *Vista-Dome* car (1945). The 35,000 men and women of the Burlington Lines are proud of its past progress and its present achievements. But they are more interested in the future. The Burlington's first century, eventful and productive, lies behind us. Ahead is a new horizon . . . a new challenge . . . a new opportunity —to serve more people better through the years to come.

BURLINGTON LINES



Through its 22 principal gateways and more than 200 interchange points, the BURLINGTON serves as an essential link between railroads from the East, West, North, and South.

Chicago, Burlington & Quincy Railroad
Colorado and Southern Railway
Fort Worth and Denver City Railway
The Wichita Valley Railway
Burlington-Rock Island Railroad

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AN ESSENTIAL LINK IN TRANSCONTINENTAL TRANSPORTATION

THE WASHINGTON AWARD ADDRESS

The Yangtze Gorge Project

John Lucian Savage

Presented at the Washington Award Dinner, April 20, 1949

The Yangtze gorge project was conceived first by Dr. Sun Yat-Sen, founder of the Chinese Republic. Many years later, in fact early in 1944, Mr. G. R. Paschal, American Economist and Export Advisor to the Chinese Government, proposed extensive power development in the Yangtze gorges in the following words: "Development of three to four million kilowatts immediately post-war, but rising to twenty million kilowatts or more at the end of ten to twenty years, as industrial development progresses and the standard of living rises." The present civil war in China, as we all know, has delayed any such plans for constructive development in that country.

Investigation in 1944

During 1944, it was my pleasure to spend six months in China on the investigation of potential multi-purpose projects on five tributary rivers of the Yangtze, and on the main Yangtze River at Ichang gorge. The tributary rivers included the Ta-Tu-Ho, Ma-Pien-Ho, Upper Ming-Kiang, Lung-Chi-Ho, and Tang-Lang-Chuan. Although World War II was continuing in the area through 1944, all of these tributary projects and the upstream portion of Ichang gorge were accessible for preliminary investigations. Other important tributaries of the Yangtze and also four of the possible alternative sites of Yangtze gorge project were in territory occupied by the Japanese army, and therefore inaccessible.

The above-named tributary river developments were found suitable for projects with power capacities varying as follows:

Ta-Tu-Ho (two projects), 1,780,000 kilowatts; Ma-Pien-Ho (one project), 260,000 kilowatts; Upper Ming-Kiang (two projects), 820,000 kilowatts; Lung-Chi-Ho (three projects), 50,000 kilowatts; Tang-Lang-Chuan (three projects), 132,000 kilowatts; TOTAL, 3,042,000 kilowatts.

It will be noted from these power capacities that the tributary rivers furnish ample latitude for progressive or stage development that will conform with future power requirements In fact, construction has been underway on some of those projects since 1945, despite the unfavorable conditions caused by World War II and the current civil war in China.

Now we shall discuss the Yangtze gorge project, which in my opinion may prove to be the greatest single multi-purpose hydro-project ever to be developed. Fortunately this project can be developed in progressive stages although the first stage, which will include the dam and diversion tunnels, is certain to bear a larger proportion of the ultimate cost than any succeeding stage.

Location

It will be noted that the Yangtze gorge project is located on Yangtze river just upstream from the city of Ichang in the southeastern part of China. A circle with center at the project and with a radius of 620 miles follows the southern and eastern coast lines of China very closely and encompasses several of the principal cities including Chungking, Kunming, Kweilin, Canton, Hong Kong, Fuchow, Shanghai, Yangku, and also the circle comes close to the important city of Peiping. In other words, the Yangtze gorge project may eventually supply power to the most densely populated one-third of China, which area probably has a population of over 200,000,000 people.

Our first task in connection with the Yangtze gorge investigations included the boat trip from Chungking to the upper Ichang gorge. The greater part of the trip was made in a 300-ton steamship that plied on regular trips between Chungking and Wanhsien during the war. From this latter city to a village at the upper end of Ichang gorge the trip was made in a small steam launch.

All inspection trips within Ichang gorge were made in hand-propelled river boats. The various legs of the trip down the river gave opportunity to observe wartime navigation on the Yangtze, which proved to be considerable despite the danger from bombing. We noted that these river boats did not move during the night. They always anchored along a steep cliff whenever an unidentified plane was reported in flight, during which anchorage all passengers left the vessel. Several wrecked steamships were observed as we approached Ichang gorge.

The famous Yangtze gorges are located along the 120-mile reach of river above the city of Ichang. There are numerous rapids and narrow canyons in this reach, and the river channel is confined between cliffs that generally are from 2,000 to 3,000 feet high. The steamships are specially designed with flat bottoms and are equipped with powerful engines. During the high water season, most of the steamships have to be pulled through the rapids by winches. Even during the low water season there is no night navigation above Ichang, because of submerged rocks and high velocities of the current.

High Cost Situation

All of these conditions have resulted in high costs for navigation. For example the pre-war rates in the gorges were: ten cents per ton-mile for navigation upstream during low water, and five cents per ton-mile for navigation upstream during high water. The costs were half as great for navigation downstream in the gorges and were only about one cent per ton-mile in the reach between Ichang and Shanghai where the river widens and flows through the delta region, usually between dikes, with slopes of only a few inches per mile.

On arrival in upper Ichang gorge we were invited to stay at the headquarters of General Wu, the Chinese general who had held the advance Japanese lines within the lower end of the gorge for more than three years. During our stay with General Wu he gave us an aerial topographic map of Ichang gorge that had been captured from the Japanese army, and which proved to be the most important data available for the preliminary investigations.

General Wu accompanied us throughout the upstream portion of Ichang gorge, which portion contained a damsite that was designated later as "Site No. 1" for the Yangtze gorge project. Five alternative sites for the project were located on the Japanese topography and the preliminary report included five economic studies embodying alternative general designs and comparative cost estimates made on the basis of the Japanese topography. The No. 1 site was the only one that could be examined on the ground during this first trip to Ichang gorge.

The No. 5 site was located at the downstream end of the gorge only three miles upstream from the city of Ichang. The dam at this site was sufficiently long so that the power units could be placed in a large gallery in the proposed concrete straight-gravity dam. All other alternative studies embodied underground power plants utilizing power-house tunnels. The five preliminary economic studies were made on the basis of natural river flow and the storage provided by the project, in other words, without including the effects of upstream storage, which effects in large part were unknown at that time.

Following conclusion of World War II and the cessation of hostilities with the Japanese in China, careful topographic survey by both aerial and ground methods were made throughout the whole Ichang gorge. Likewise, careful geologic investigations were completed by surface examination. Also, a contract was arranged between the Chinese Government and the U. S. Bureau of Reclamation wherein the Bureau was employed to prepare general designs and specifications for the Yangtze gorge project and for the tributary projects. The preparation of these general designs and specifications was assigned to the Denver office of the Bureau and work was started on the designs of the Yangtze gorge project during June 1946.

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The Yangtze Gorge Project

(*Continued from Page* 31)

The design work was continued until August 15, 1947, when, due to financial straits caused by the economic effects of the civil war in China, the contract with the Bureau of Reclamation was suspended temporarily and all work stopped. Although the preparation of designs had not reached a stage that might be termed final for any of the main project features, the progress was sufficient so that an interim report could be prepared showing a tentative general plan or layout of the Yangtze gorge project and tentative detail designs for certain main features of the project.

Flood Conditions

The mean annual flow of Yangtze River at the proposed Yangtze gorge damsite is 540,000 cubic feet per second, and the maximum recorded peak discharge is 2,680,000 cubic feet per second. The maximum probable flood is estimated to have a peak flow of 3,320,000 cubic feet per second and a flood volume of 214,000,000 acre-feet. The importance of flood control will be obvious from the recorded flood number of people affected, 28,600,000; number of people lost, 145,174; total damages caused by the Yangtze River flood of 1931. This record shows the following:

Area flooded, 45,000 sq. miles; farm lands flooded, 10,400,000 acres; damage exclusive of highways, railroads and dikes, $420,000,000 (U.S.).

Comparison of Yangtze Gorge Dam with U. S. Dams

		Yangtze	*Hoover*	*Coulee*	*Shasta*
Height of dam	ft.	820	726	550	602
Concrete in dam	c.y.	18,000,000	3,300,000	9,700,000	5,000,000
Spillway and outlet capacity	s.f.	3,300,000	400,000	1,000,000	200,000
Drainage area	sq.mi.	380,000	167,800	74,100	6,600
Reservoir capacity	A.F.	50,000,000	31,000,000	9,500,000	4,500,000
Reservoir length	mi.	450	119	146	31
Reservoir area	sq.mi.	375	246	127	46
Mean annual flow in	A.F.	386,000,000	13,000,000	79,000,000	5,000,000
Mean annual flow in	S.F.	540,000	18,000	109,000	7,200
Ultimate installed power	KW	17,500,000	1,323,500	1,974,000	375,000

Power Resources

With a dam of height to provide a reservoir at elevation 668 feet during the winter and elevation 656 feet during the summer, and with an installation of one hundred 175,000-kilowatt units or a total installed capacity of 17,500,000 kilowatts, and without upstream storage, the firm power will be 6,000,000 kilowatts and the secondary power will be 11,500,000 kilowatts. However, with potential upstream storage fully developed, the Yangtze gorge power plant can operate as a base load plant at practically 100 percent load factor and the full 17,500,000 kilowatts will become firm power. In comparison with various large existing hydro-projects it will be noted that the Yangtze gorge project greatly exceeds the Hoover, Grand Coulee, and Shasta projects in height of dam; quantity of concrete; spillway and outlet capacity; drainage area; reservoir capacity, length, and area; mean annual flow of river; and ultimate installed capacity of the power plant:

It is believed that the Yangtze River is navigable throughout a longer distance than any other river in the world, and that under present conditions the Yangtze is exceeded only by the Rhine River in volume of traffic. Lacking river improvement, the average drafts available for navigation in various reaches of the river upstream and downstream from Ichang gorge are recorded as follows: Chungking to Ichang, 7 feet throughout the full year, and 15 feet throughout July, August, and September; Ichang to Hankow, 7.5 feet throughout the greater part of the year, and 23 feet during July, August, and September; Hankow to Shanghai, 15 feet throughout eight months, and 35 feet throughout four months of the year.

During the years 1931 to 1937, the combined upstream and downstream cargo traffic between Chungking and Wanhsien aggregated about 350,000 tons; and between Wanhsien and Ichang about 600,000 tons; and between Nanking and Wuhu about 4,850,000 tons. The Pre-World War II costs were 8 cents per ton-mile for 6-

foot draft and 1.3 cents per ton-mile for 30-foot draft.

It is estimated that the average annual tonnage through the locks at Ichang gorge, during the 50 years following completion of the project, may fall between 8,000,000 and 10,000,000 tons. With a minimum reservoir elevation of 550 feet at the Yangtze gorge dam, vessels of 33-foot draft can enter Chungking harbor; and with river improvement between Ichang, Hankow, and Shanghai, vessels of deep draft can navigate the river from its mouth at Shanghai to Chungking during long periods of the year. After available upstream storage is fully developed on the main and tributary rivers above Yangtze gorge dam, the downstream flow will be practically constant at 500,000 cubic feet per second, and the water depth can be maintained for full-year navigation.

The preliminary general layout of the project shows a relatively short main river channel portion of dam; two long right and left abutment portions of dam; upstream and downstream cofferdams; ten diversion tunnels extending from the river channel upstream from the upstream cofferdam through the right abutment to the river channel below the downstream cofferdam.

Penstock tunnels extend from the unstream face of right abutment portion of dam to the power units installed in the right powerhouse tunnel; tailrace tunnels extend from the right powerhouse tunnel to the river channel below the dam, including the downstream portions of the ten plugged diversion tunnels; penstock tunnels extend from the upstream face of the left abutment portion of dam to the power units installed in the left powerhouse tunnel; tailrace tunnels extend to the open tailrace channel leading to Chang-Chiao-Chi River and thence to Yangtze River downstream from the dam.

The general layout also shows the outlets through the river channel portion of dam; penstock and river outlet trashracks on the upstream face of dam; headrace channels upstream from the right and left abutment portions of dam; access roads, also the ship locks, ship canals, and docks for transferring passengers and freight during construction of the dam.

The Yangtze gorge project will provide a full irrigation supply for 5,000,000 acres of land not now irrigated, of which 1,150,000 acres would be irrigated by gravity and 3,850,000 acres by pumping. Also, several million acres of partially irrigated lands would be provided with a supplemental supply sufficient to grow a second crop of rice.

Sedimentation

The upper reaches of the Yangtze River carry comparatively heavy sediment loads and the annual deposition in the reservoir without upstream storage would be very large. It has been estimated that the Yangtze River

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The Yangtze Gorge Project

(*Continued from Page* 33)

above Chungking carries an average of 250,000 acre-feet of sediment per year, and that the Chialing River above its confluence with the Yangtze at Chungking may carry another average of 250,000 acre-feet per year, making a total average of 500,000 acre-feet of sediment per year brought into the main river.

Without upstream storage, and assuming that three-quarters of the total volume of 375,000 acre-feet of sediment is deposited in the reservoir annually, the life of the reservoir would be 165 years. However, upstream storage would increase this life to several hundred years. It appears that extensive dredging operations will be necessary to maintain the harbor at Chungking unless upstream storage is provided on the Yangtze and Chialing Rivers. Also, it appears necessary to provide unusually large capacity outlet works of suitable design for passing sediments under flood conditions and density currents under low reservoir conditions.

Many construction problems have received careful consideration in carrying out the general and detail design studies of the Yangtze gorge project. For the project as now proposed, a qualified organization could develop a program of construction permitting unusually efficient use of heavy construction equipment and experienced construction personnel. Simultaneous construction of different main features of the project will be possible to an unusual extent. The Bureau of Reclamation engineers have estimated that, with the many places available for construction operations a relatively short construction schedule would be possible. Having ample modern equipment and using American methods of construction, they estimate that the first stage of the Yangtze gorge project, including the dam, one system of ship locks and an initial power installation of perhaps nine main units, could be completed within a period of eight to ten years.

WSE Resumes Library Service

John E. King, recently appointed chairman of the Library Committee to replace Fred A. Rogers, announces that the plans in conjunction with the John Crerar Library have been completed.

Members may take out books by requesting them either in person or by telephone from the Society. We now have our card file in the office and will look up the book desired; then we will check with Crerar to see if they also have it; and if they do, this book may be taken out.

It will take only about fifteen or twenty minutes to get the book from Crerar, but if it is shelved at Newberry Library, a half day may be necessary since Crerar makes scheduled trips to and from Newberry. We also are cataloging our new books, with the welcome help of Crerar, so these may be available to our members.

As we get the plan functioning, we believe it will prove to be quite successful.

MIDWEST POWER CONFERENCE

Features Technical Sessions, Addresses on Atomic Energy, U. S., Local Generating Facilities

The Midwest Power Conference, of which Western Society is one of the co-operating organizations, closed April 20, after three full days of technical sessions and addresses on the various aspects of power.

One of the most interesting addresses was given by Dr. Norman Hilberry, Deputy Director, Argonne National Laboratory.

Dr. Hilberry, reminding his audience of the difficulty of being brief about atomic energy, explained his plan to "avoid as far as possible the meticulous elegance of scientific detail" and to present, instead, an "impressionistic but . . . valid picture of the field of nuclear energy." His talk took the form of answers to the questions, "What?", "Why?", "Where?", "When?" and "How?"

He explained the first question, "What is nuclear energy?," by presenting some of the similarities and some of the differences between nuclear energy and the energy produced from ordinary fuels.

He described the actions which take place in a steam boiler burning coal, where carbon and oxygen atoms combine to form molecules of carbon dioxide, loaded with excess energy, which causes the molecules to collide, forming thermal energy.

Fission Described

In the nuclear energy case, he stated, "In the field of nuclear physics it has been found that the nuclei of certain atoms, become completely unstable and literally blow apart if by chance one adds to their structures a single additional neutron. As the nucleus explodes, the resulting fragments traveling with prodigious speeds collide with the atoms in their paths transferring part of their energy at each collision into kinetic energy of the particles struck.

"This, of course, produces thermal energy in the system. It happens that, in the explosion, not only does the nucleus generally break into two major atomic fragments, but also extra neutrons are ejected. If one of these extra neutrons strikes another nucleus, this nucleus in turn explodes, yielding its two major atomic fragments and its extra neutrons. This process continues, provided the extra neutrons are properly conserved within the system.

"The elementary products of these two chain reaction processes are then these. In the case of carbon and oxygen we have newly formed molecules and thermal energy. In the case of the nuclear chain reaction the elementary products are the two fission fragments which unfortunately are highly radioactive atoms, something more than one neutron, and again thermal energy. It should be noted that in the first case conservation of the thermal energy is required in order to keep the operating temperature high enough for the chain reaction to be maintained. The boiler is fundamentally, therefore, a thermal device. In the case of the nuclear chain reaction the thermal energy is truly a by-product and the thing that must be conserved to maintain the chain reaction is the bonus of extra neutrons given off in each fission process. Thus the nuclear reactor is basically a neutron machine but one in which the neutron production is almost inseparably associated with heat production."

In explaining other similarities, Hilberry showed that a certain critical mass of fuel in the boiler, and of nuclear fuel in the reactor, is necessary if the reaction is to be sustained.

Looking at the problem of control, he reminded his audience that "the control of a boiler is achieved by controlling the rate at which coal and oxygen are introduced as compared to the rate at which thermal energy is abstracted from the boiler."

He explained that the problem in the nuclear reactor "is basically somewhat simpler in that the control of the reaction is determined in general only by the control of the number of neutrons present. This can be accomplished by the insertion of a neutron absorber into the region in which the reaction is taking place." He continued, "The reaction can be maintained at any level of activity by placing this control absorber in a position in which it absorbs all of the excess neutrons being produced in the reaction over and above the actual number required to keep the chain reaction going."

In enumerating the differences between the steam boiler and the nuclear reactor, he pointed out that while the space around the boiler is simply "too hot for comfort," the region around the reactor core is not only thermally hot, but "hot" in the radioactive sense. As he explained, "most of the nuclei of structural materials which absorb neutrons likewise become radioactive, and among the radiations given off by these various nuclei are the very penetrating gamma rays. Thus around a nuclear reactor there must be constructed a protecting shield to reduce both gamma ray and neutron intensities," He further explained that "the significant factor is the total mass of material interposed in their path." He pointed out both the biological considerations that are involved, and the restrictions that the protection requirements place on the use of the reactor for mobile power sources.

Another difference between boiler and reactor, is the waste product that remains. In the first case, the usual residual is innocuous gases and ashes, but with the reactor, the waste is highly radioactive and retains the radioactivity in some cases for many years. These "must be stored in shielded containers for the decades necessary until their radioactivity has decayed to insignificant levels," according to Hilberry.

Surplus Is Possible

Another startling difference is apparent. As Hilberry stated, "Due to the nuclear characteristics of the fission process, however, it is theoretically possible in certain instances that one can form more fissionable material in a nuclear reactor than one uses. . .Since it is impossible to have a nuclear reaction such as we are discussing without the generation of heat energy, this "breeding" process holds forth the possibility of the production of useful power together with the production of more fissionable material than is used up in its production.

He then pointed out "one very uncomfortable but inescapable difference"

(*Continued on Page* 36)

Midwest Power Conference

(*Continued from Page* 35)

between the steam boiler and the nuclear reactor. If, he explained, it were necessary for you to keep your entire supplies of coal in, let us say, one ton lots, and "if by some technical device these two one-ton lots could be made to explode with unheard of violence, I suspect that the responsibility might weigh upon you rather heavily." For this reason, he said, it is "essentially impossible to separate the economic implications of a supply of fissionable fuel materials from the military implications."

Nuclear Power Advantages

Moving to the question, "Why develop nuclear power?," he gave four primary reasons. 1. Nuclear energy is a new and highly efficient source of energy. 2. It is produced from a higly concentrated fuel. 3. The radioactive by-products of nuclear reactor operation may prove to be of great industrial significance. 4. From the industrial point of view the most spectacular reason for exploitation of nuclear energy lies in the breeding process.

As to the question, "Where will nuclear power be used?," he pointed out that "the characteristic of a nuclear fuel that can be capitalized most easily is, of course, the fact that it is so highly concentrated." Thus, its use for ship propulsion, freeing the ship from the usual fueling requirements, is indicated, as well as its use for power supply at locations so isolated that transportation of normal fuels . . . "becomes prohibitive economically."

In considering the "always controversial" question, "When will useful nuclear power be available?," he stated, "The answer to this question depends to some extent on technical questions, but in the final analysis the determining factor lies in purely political considerations."

He pointed out the enormous technical problems, such as finding new structural materials which can withstand the neutrons, studying the fuel elements themselves since "as the reaction progresses, fission products build up within the body of the fuel element," the problem of heat transfer from the fuel element to the coolant, and many others.

He stated however, that "all of the above problems involve to a large extent straightforward development work," and says that "the thing that is required is largely a matter of man-hours and research breaks."

He further explained, "If I were forced to produce a figure" of a probable length of time required for the program, "and this would be a highly personal estimate, I suppose I might say that it could be done in five years."

"Fundamentally," he said, "how soon we have useful power from nuclear energy will be answered by the American people through their Congress. The people and the Congress must make individually and collectively a clean cut evaluation of the situation and what they want from it. Then they must tell us the results of the evaluation in terms of the over-all level in dollars which they feel they should support. The evaluation should be carefully made on a long term basis."

"As you all know," he said, "one of the greatest strengths of any research and development organization lies in its team work, and team work is extremely difficult in an organization which continually fluctuates."

In considering the final question, *How*, he said, "If nuclear power is to be of major significance as a general power source as opposed to a highly specialized supply, we must either develop methods for the recovery of uranium from low grade ores or achieve success with the power breeder type of nuclear reactor. Both avenues must be and are being explored."

As he explained, besides research into new ore recovery processes, and programs to encourage prospecting for new sources of uranium, "the status of the power breeder as a practicable device" must be established at the earliest possible moment.

Two of the four reactors now in process of development and design are experimental units to investigate the practicability of power breeders. These are at Argonne National Laboratory and at Knolls Atomic Power Laboratory.

The third reactor on the program will be "a test reactor in which the operating level is closely that required in a power reactor and in which facilities have been designed making it possible to test proposed structural materials, fuel elements, possible reactor components, etc. under essentially the same operating conditions that will be faced in the power reactor under design."

He stated that "it is a joint effort of Oak Ridge National Laboratory and Argonne National Laboratory."

The fourth power reactor, he stated, "is one being designed for the purpose of powering naval vessels. The research and engineering design on this unit are being done by Argonne National Laboratory, while Westinghouse is undertaking the constructional design and will build the unit."

U. S. Power Supply

Another address of national scope was given by E. Robert de Luccia, Chief, Bureau of Power, Federal Power Commission, Washington, D. C. His subject was "Power Supply and Requirements in the United States."

De Luccia stated, "We estimate the electric energy requirements on utility systems will increase from 283 billion kilowatt-hours in 1948 to 525 billion

kilowatt-hours in 1960, or about 85 percent; and demands for power at time of peak loads will increase from 54 million kilowatts in 1948 to about 100 million kilowatts in 1960. To serve this load with reasonable reserves a power supply of 115 million kilowatts is required."

He continued, "The production of electric energy by industrial establishments which operate their own generating plants increased from 38 billion kilowatt-hours in 1940 to 54 billion kilowatt-hours in 1948, an increase of 42 per cent. We estimate that industrial establishments will produce from their own plants 75 billion kilowatt-hours in 1960 and require 19 million kilowatts of generating capacity."

"In closing," he said, "I wish to leave one thought with you—as long as we are operating with little or no reserves we will continue to have shortages of power in various parts of the country, due to drought conditions, sudden increases in load, breakdown of equipment, or other reasons. Power-wise, we are now living a hand-to-mouth existence . . . an economy of abundance requires an abundance of electric power."

Local Power Supply

T. G. LeClair, Assistant Chief Electrical Engineer, Commonwealth Edison Company, and a member of Western Society of Engineers, spoke on the outlook for power in Chicago and northern Illinois. His subject was, "Power Supply for a Large Metropolitan Area."

He described the program of the companies supplying electric power to Chicago and most of northern Illinois, namely, Commonwealth Edison Company of Northern Illinois, Illinois Northern Utilities Company, and Western United Gas and Electric Company.

He stated, "Owing to restrictions imposed during the war on the construction of facilities and to the unprecedented growth in load during and since the war, the reserve electric generating capacity of the companies has been absorbed. Distribution facilities have been heavily loaded. To correct these deficiencies in reserve capacity, which accumulated during the war years, and to provide additional facilities for the steadily increasing demand, a major plan was started as soon as restrictions were removed. Although this program was delayed by shortages of labor, materials, and equipment, the companies have expended for gross plant additions, including some additional gas facilities outside of Chicago, an amount in excess of $188,000,000 during the three postwar years ending December 31, 1948. Nearly half of this amount, or an investment in excess of $90,000,000, was expended in 1948 alone."

"To meet the large past and future increase in load," he said, "the Commonwealth Edison Company and subsidiary companies are now engaged in the largest generating station construction program in their history. Since the end of the war, two new generating units totaling 157,000 kilowatts have been placed in service, and five additional units with a total capacity of 667,000 kilowatts in various stages of construction bring the postwar progam, to date, to a total of 824,000 kilowatts. This capacity is urgently needed, and although every effort is being made to complete the program as fast as is physically possible, the last unit in the program is not scheduled for service until 1952, at which time the system reserve is expected to be re-established at a normal level."

Surveying Conference

The Seventh Annual Illinois Conference on Surveying and Mapping, to be held at Urbana, Illinois, will be held May 27-28, rather than May 20-21 as previously announced. M. O. Schmidt, Department of Civil Engineering is director of the conference.

Speaker Sees World Cooperation Among Engineering Groups

Robert M. Gates, a member of the United States National Commission for UNESCO, said in a recent address at Cleveland, Ohio, that closer ties between American and European engineers are in the making. Mr. Gates, who is a past president of The American Society of Mechanical Engineers, represented the Engineers Joint Council, comprising five national engineering societies with 100,000 members, at the Second National Conference of the Commission.

"The Engineers Joint Council has assisted in the formation of closer ties among all groups, and will continue this policy," he said. "During the past few years, in particular, we have sent representatives to Paris, Zurich and Cairo to participate in the World Engineering Conference. Our representatives have also met in London with the three British engineering institutions in an effort to establish better understanding and cooperation between European and American engineering societies. It seems more than probable that out of these conferences will evolve a plan for a new European-American engineering organization.

"The Engineers Joint Council has been very active also with representatives of the South American engineering societies in planning a Pan-American Union of Engineers, which is to organize at Rio de Janeiro in July of this year. Some eighty-odd papers on engineering subjects are being prepared for this conference by engineers in this country."

Engineering has a contribution to make to the broad problem of world peace and prosperity, Mr. Gates believes.

"Scientists tell us that there are ample natural resources and knowledge of how to use them to meet the material needs of the world's present population," he said. "The problem is how to spread that knowledge and to apply it to those resources. This primarily is an engineering job."

He defined engineering as the utilization of the forces and materials of nature for the benefit of mankind.

"We are convinced that a world council table for engineering societies, with a set of simple objectives mutually agreed upon, could work out a program of inestimable value to all mankind. Toward this end the Engineers Joint Council has adopted a statement of policy to foster and support world engineering cooperation."

Mr. Gates said this policy includes: (1) cooperation with engineers in other countries in the practical advancement of engineering and engineering techniques; (2) assisting in further technical education and knowledge in those countries and rendering assistance in the form that will be most useful; (3) giving such aid as may come within the scope of professional societies to those countries in need of engineering services for the readjustment of their economic life, and (4) participating on behalf of the engineers of the U. S. in federations of engineering bodies in the United States.

WSE Tours Standard Oil

Standard Oil Company of Indiana's new Research Laboratory at Whiting was the destination of a WSE excursion on Thursday, April 21, arranged by C. C. Bowers, Chairman, Arrangements and Excursions.

Members of WSE met at the plant and were guided through the laboratory, located a few blocks from the Whiting refinery.

Construction of the laboratory was begun in September, 1945. The gross floor areas of the units included in the initial phase of construction is 292,090 square feet. Upon completion, this research plant will house 420 chemists, chemical engineers, and other scientists, along with 800 technicians and other assistants.

The main entrance is situated in the building housing the research offices. In this front building are located the executive and administrative offices of the Research Department and divisions of chemical engineers concerned with process design, exploratory economics, and pilot plant development.

Access to the main laboratory buildings may be gained from the central stair hall of the office building. The main laboratory is a three story T-shaped building laid out in units with movable partitions. The majority of laboratories are double unit rooms. It is planned that each will be occupied by two technical people.

Research and development work in the main laboratory will be centered on improving motor gasoline, aviation fuels, and many types of lubricants. A major portion of the program will be concerned with the expanding field of chemicals from petroleum. In addition, attention will be given to Diesel fuels, solvents, heating oils, additives, white oils, metal working oils, waxes, petrolatums, and asphalts. Other studies will include hydrocarbon synthesis, fundamental research on the properties of hydrocarbons and related compounds, and the development and application of chemical and instrumental methods of analysis.

The current construction includes three process laboratory buildings which are not connected to the larger buildings. These buildings will house the pilot plant activities in the development of products.

Filtration for Chicago

(*Continued from Page* 18)

facilitate its acquisition. The area between Hudson and Orleans Streets and between Oak Street and Chicago Avenue would be available immediately. These two areas, combined, are approximately equal in size to the area designated for the lake front site development.

In summary, the advantages of the proposed inland site include:

1. It would not establish a precedent, as would the Navy Pier site, opening up to industrial-type uses the central part of Chicago's magnificently developed lake front.

2. It would result in the elimination of several hundred residential structures which are in very poor condition, in one of the most badly deteriorated residential sections of the city. While the present housing shortage would preclude demolition of these structures in the immediate future, it is believed that by the time the project would be ready to go forward, it would be possible to relocate the persons now resident upon the site.

3. It would open up badly needed acreage for park and recreation use in a crowded section of the city which is in need of such facilities, and would make unnecessary the additional expenditure of approximately a million dollars for this purpose, as is now contemplated by the Chicago Park District.

It is the duty of the Plan Commission to view such important public works undertakings as to their long-term impact upon their immediate environs and upon the city as a whole. The present lake front development which resulted from the vision of Chicago's earlier city planners should not be jeopardized for the sake of expediency.

Letters to the Editor

March 15, 1949

Western Society of Engineers,
84 East Randolph Street,
Chicago 1, Illinois.

Att: Mr. D. Steger, Secretary

Dear Mr. Steger:

In the March issue of the MIDWEST ENGINEER is a partial transcript of an address by Mr. A. G. Bryant entitled "European Recovery and American Industry." Mr. Bryant made a remark in this address concerning Switzerland, which requires a correction.

Mr. Bryant said, "Recently watch factories in Connecticut have been closed down because of Swiss competition and many hundreds of employees have been released. Our aid is pouring into Switzerland and is bouncing back at us in the form of competition which is closing down some of our old established factories."

I believe that Mr. Bryant refers to the Waltham Watch Co., which recently closed down. There is a strong reason to believe that the necessity of closing this plant was due to weakness in management rather than direct competition. Hamilton and Elgin, two of the largest American watchmakers have experienced their most profitable year in 1948 in spite of Swiss competition. By the way, Swiss competition in the watch industry existed long before World War II.

As to the second sentence of the paragraph quoted, I might say that Switzerland has not received in the past nor is receiving now, financial aid from us under the Marshall plan, but is a participating nation as a contributor. Switzerland like ourselves, has granted large credits, in proportion to their wealth, to many European nations to aid them in their recovery. Switzerland at the present time is importing from the States two to two and a half times as much as she has been able to export to us and is paying cash in American dollars for the excess.

I wish you would pass these remarks on to Mr. Bryant.

Yours very truly.

H. H. Sonderegger

HHS:LM
Enc.

Plan Interesting New Exhibits at

THE 1949 RAILROAD FAIR

The 1949 Chicago Railroad Fair opens June 25 for 100 days of pageants, exhibits, rodeos, movies and other new features. This year the fairgrounds have been greatly improved by the addition of covered ways as protection against sun and sudden showers; widening and black-topping of walks; and the installation of more adequate comfort facilities.

Among the highlights of the 1948 show to be retained will be the gigantic pageant "Wheels a-Rolling," the Deadwood Central system with a second narrow gauge train, the Train of Tomorrow, Old New Orleans, the New Mexico pueblo village, the Florida exhibit of railroads, the dude ranch and rodeo, and the Rocket village presentation with its square dancing and hillbilly fiddling.

The famous Fiesta diner of the Rocket village again will be featured and in addition to the beautiful streamlined diner, a green and gold replica of the 1880 "Palace" dining car also will provide sandwich and soft drink service to the Rocket village visitors.

Something brand new will be added to the exhibits in the acquisition of the Cafe St. Louis, the world's first all-electric dining car.

The "Florida in Chicago" exhibit will be bigger and better and completely different from last year's. It will include a 30-foot scale replica of the Bok singing tower, the picturesque bird sanctuary at Lake Wales, Florida; an "Avenue of Palms," and more than 2,000 varieties of unusual flora.

Another feature to be introduced this year is the San Francisco cable car of the 1880's. All rides will be free, souvenir tickets being available at the Golden Gate Theatre where a motion picture "California's Golden Beginning," also free, will be shown continuously throughout the day and evening.

An exact replica of the famed Moffat Tunnel, which pierces the Continental Divide 50 miles west of Denver, will be erected for the 1949 Fair. The original tunnel is 6.2 miles long and contains a single track made of continuous, jointless, welded, 131-pound rail, only installation of its kind in the country.

The legendary Nova Scotia Coach, dean of all railroad passenger equipment on this side of the Atlantic, will make its appearance this year. This coach was the first railroad car used in Canada and is said to be the oldest railway passenger coach on the North American continent, built in London and shipped to America in 1838.

One of the latest new features to be added to the Fair is a frontier town called "Gold Gulch." Gold Gulch will have about everything which would be found in a real 19th century mining community. For example, there will be a Grubstake eating place, a sheriff's office, jail and courthouse, and plans call for a general store, newspaper office, a Chinese laundry and a shooting range. A town barber shop with ancient red plush chairs and brass cuspidors will give a first class shave or haircut. The gold mine burros will be available at a nominal charge to give young folks a ride around the diggings.

Vitarama will be shown to the public for the first time as a feature attraction at the Fair. This presentation is a system of slide projection employing the use of five screens and a 10-lens projector. The five screens will cover an entire wall of one building. A remarkable feature

Publish 'Blue Book' Of Highway Manners

The well-known authority on eitquette, Emily Post, has written, in cooperation with the National Highway Users Conference, Inc., a "blue booklet" titled "Motor Manners." Mrs. Post suggests manners not only for the driver, but also for passengers and pedestrians in this 46-page publication.

This booklet, attractively put together with line drawings illustrative of the text is a handy size for the automobile pocket . . . 7" by 5". It is written in a facetious manner with questions and answer style, yet contains courtesies any thoughtful driver will wish to brush up on. The booklet may be obtain from the National Highway Users Conference, Inc., National Press Building, Washington 4, D. C., in quantities of 25,000 for 5 cents; 2,500 for 8 cents; and 1,000 (minimum quantity rate) for 9 cents. Individual copies are 10 cents.

Western Society

290-80 Lawrence H. Harmon, Sr., Assistant Project Manager, Maxon Construction Co., Inc., 131 N. Ludlow St., Dayton 2, Ohio.

291-80 Robert H. Bloedel, Power Engineer, Public Service Company of Northern Illinois, 1701 S. 1st Ave., Maywood, Ill.

292-80 Harold S. Patton (Rein.), Vice President, Public Service Company of Northern Illinois, 72 W. Adams St.

293-80 Arthur N. Flint, Power Supervisor, Public Service Company of Northern Illinois, 423 Childs St., Wheaton, Ill.

294-80 Stanley A. Kumiega, 1147 W. Superior St., attending Illinois Institute of Technology.

295-80 Robert G. Muench, 2831 Eastwood Ave., attending Illinois Institute of Technology.

296-80 Edward C. Preston, Field Engineer, Commonwealth Edison Company, 72 W. Adams St.

297-80 John E. Tobin, 11256 S. Artesian Ave., attending Illinois Institute of Technology.

298-80 Robert C. Wiese, 5931 N. Paulina St., attending Illinois Institute of Technology.

299-80 Raymond A. Finch, Equipment Engineer, Western Electric Co., Hawthorne Station.

300-80 David S. Felsenthal, Jr., Valuation Engineer, Marshall and Stevens, 53 W. Jackson Blvd.

301-80 E. L. Michelson, Section Engineer, Commonwealth Edison Co., 72 W. Adams St.

302-80 Arnold P. Brown, 8322 Luella Ave., attending Illinois Institute of Technology.

303-80 Alan E. Law, 1754 W. 95th Pl., attending Illinois Institute of Technology.

304-80 George W. Marley, Supervising Engineer, Secondary Dist. Planning, Commonwealth Edison Co., 72 W. Adams St.

305-80 Melvin L. Orloff, 7047 S. Wolcott Ave., attending Illinois Institute of Technology.

306-80 John G. McNamara, 6148 S. Winchester Ave., attending Illinois Institute of Technology.

307-80 Miss Margaret G. Coyne, Lawyer, United States Government-Social Security Administration, 366 W. Adams St.

308-80 Robert B. Cheever, 11633 S. Eggleston Ave., attending Illinois Institute of Technology.

309-80 John P. Donovan, Engineer, A. J. Boynton & Co., 58 E. Washington St.

310-80 Robert C. Eddy, Engineer (Civil), Corps of Engineers, U. S. Army, R-520, Merchandise Mart.

311-80 Austin J. King, Salesman and Engineer, Binkley Coal Co., 230 N. Michigan Ave.

312-80 Robert C. Lanphier, Jr., Vice President, Sangamo Electric Co., Springfield, Ill.

313-80 Robert W. Carleton, Vice President, Alex Janows & Co., 865 N. Sangamon St.

314-80 Roy M. Jacobsen, Structural Draftsman, Sears, Roebuck & Co., 925 S. Homan Ave.

315-80 John W. Meyer, 8436 Crandon Ave., attending Illinois Institute of Technology.

Applications

316-80 James L. Foley, Jr., Senior Planner (Traffic), Chicago Plan Commission, City Hall.

317-80 Leo M. Arms (Rein.), Engineer, Portland Cement Association 33 W. Grand Ave.

318-80 John P. Dunne, 5747 S. Fairfield Ave., attending Illinois Institute of Technology.

319-80 Martin Weidenbach, Jr., 4840 S. Greenwood Ave., attending Illinois Institute of Technology.

320-80 Albert M. Davis, Midwest Regional Manager, Portland Cement Association, 33 W. Grand Ave.

321-80 Wallace B. Behnke, Jr., Assistant Power Engineer, Public Service Company of Northern Illinois, Box 278, Glencoe, Ill.

322-80 John L. Verre, 6535 S. May St., attending Illinois Institute of Technology.

323-80 Robert G. Fyr, Electrical & Mechanical Engineer, Sumner S. Sollitt, 307 N. Michigan Ave.

324-80 Irving Buchstaber, 540 W. Cornelia Ave., attending Illinois Institute of Technology.

325-80 Louis H. Stott, Engineer, Robert W. Hunt Co., 175 W. Jackson Blvd.

326-80 James H. Sawyer (Rein.), Assistant Bridge Engineer, Cook County Highway Department, 160 N. LaSalle St.

327-80 John B. Eberlein, Chief Engineer, A. J. Boynton & Co., 109 N. Wabash Ave.

328-80 Richard D. Harza, Engineer, Civil Section, Harza Engineering Co., 400 W. Madison St.

329-80 Russell Mansfield, (Rein.), Vice President, Perry Construction Co., 251 W. 79th St.

330-80 Charles R. Schuler, Section Engineer, Commonwealth Edison Co., 72 W. Adams St.

331-80 Edwin C. Ward, Sales Engineer, United Cork Co., 1151 Eddy St.

332-80 William C. Whitcher, Assistant Staff Planner, Commonwealth Edison Co., 72 W. Adams St.

333-80 James J. Corolis, Sales Engineer (Trainee), Chicago Metal Manufacturing Co., 3724 S. Rockwell St.

334-80 Frank C. Drysdale, Assistant Manager, Buildings Power & Light Corp., 431 S. Dearborn St.

335-80 A. Allan Bates, Vice President for Res. & Dev., Portland Cement Association, 33 W. Grand Ave.

336-80 Byron E. Putman, Supervisor, Voltage Survey, Commonwealth Edison Co., 72 W. Adams St.

337-80 Herbert R. Miller, Sales Engineer, The Oxweld Railway Co., 230 N. Michigan Ave.

338-80 Walter J. Riser, 4743 W. Grace St., attending Illinois Institute of Technology.

339-80 Edward P. Roe, Sales Department, Universal Atlas Cement Co., 208 S. LaSalle St.

340-80 Kenneth W. Graybill (Trsf.), Chief Engineer, Automatic Electric Co., 1033 W. Van Buren St.

341-80 John D. Larkin, Specifications Engineer, Chicago Transit Authority, 79 W. Monroe St.

342-80 Richard G. Weckerlin, 3818 N. Nottingham Ave., attending Illinois Institute of Technology.

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Filtration for South District of Chicago

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pump impellers. This was solved by raising the temperature of the water a little less than 0.1 degree Fahrenheit by piping live steam to each suction pipe. On one occasion, the 5′ x 8′ ports of the shore intake were blocked. Reversal of flow from the settling basins raised the water level in the intake basin above lake level, and cleared the openings.

Trouble of a different nature came during the winter of 1947-1948. By this time the tunnel connections had been completed, and the plant was taking its supply from the Dunne Crib. On a number of occasions the operators at the crib found it necessary to clear the ports by detonating short lengths of dynamite opposite the ports. On January 27, 1948 ice formed so rapidly at the crib that even blasting at five minute intervals could not keep the ports open. The water level dropped rapidly in the intake basin, and only prompt action by the operating personnel at the filtration plant in cutting the shore intake water maintained the raw water supply to the plant. It was two days later that the north district tunnel system was blocked with ice, and the entire north side was out of water for several hours. Filter operators during cold weather periods watch closely for any signs of trouble, such as ice formation on a tell-tale chain hanging in the intake basin, the lowering of the water level in the same basin, and reductions in pump capacities as shown on venturi meter charts. Providing two entirely separate sources of supply for the South District filtration plant, and the availability of competent operating personnel at each source, have, in our judgment, greatly increased the reliability of winter operation.

In taste and odor elimination, the plant operators are confronted with their most variable problem, and one which requires constant vigilance. Activated carbon is used for taste and odor removal, and the quantity must be increased to meet increased tastes and odors. A change in wind direction can increase the odor threshold from 4 to 40 in two hours. As an example of extreme variation, consider what happened about two months ago. The odor threshold jumped from 4 at 7 a.m. to 35 at 9 a.m. and on up to 80 at 12 noon. By 3 p.m. it had dropped back to 4. During the ten hour period from 8 a.m. to 6 p.m., a series of eight changes were made in the carbon dosage, starting at 30 lbs. per million gallons, running up to 500 lbs. per million gallons, and dropping back to 70 lbs. per million gallons.

One new development at South District may be of general interest. A pilot dehydrating plant has been installed in the wash water pump room to reduce the humidity. So far it has been entirely effective in drying up what previously was an extremely moist area with water dripping from pipes and walls. The volume of the room is 234,000 cu. ft., the capacity of the dehydrating unit is 5,000 cfm. A form of lithium chloride is the dehydrating agent. Data on cost of operation is now being established, and if the annual costs indicate that similar equipment for drying up all filter pipe galleries is economically feasible, its installation will be recommended.

A word as to costs and financing. The cost of the plant to date is $26,400,000. This was financed from the following sources:

	Amount	*Percent of Total*
P.W.A. Grant	$ 5,700,000	22
Water Fund	2,800,000	10
Water Certificates	17,900,000	68
	$26,400,000	100

Water certificates are not general obligation bonds, but are dependent entirely on the earnings of the water department for interest payments and repayment of principal. No tax funds are available for the support of the department.

We have been more than pleased by the general acceptance by the public of the plant and its surroundings as a cultural and recreational area. From the start of operations we have had increasing numbers of visitors, including a large number of group organizations from high schools, colleges, commercial institutions, Y.M.C.A.'s, churches, the American Legion, League of Women Voters and of course technical groups. Engineers from all over the world have visited the plant.

And now may I make a statement with respect to Mr. Howson's discussion of filtration for the rest of Chicago. When funds for post war planning became available, the Commissioner of Public Works, Oscar E. Hewitt, was instructed by the City Council to make application for such funds for the planning of water filtration. The City Engineer, W. W. DeBerard, having in

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Filtration for North And Central Districts

(*Continued from Page* 16)

Quantities—

320 MGD for the north district.
630 MGD for the central district.

Design Bases

In studying filtration plant layouts and sites, the following basic factors were adopted:

Intakes—

Where practicable water would be taken either from existing cribs and tunnels and from shore intakes—the dual inlets protect against ice hazards.

Mixing—

Quick mix—2 minutes.
Slow mix—30 minutes.

Coagulating—

3 hours.

Filtration Rate—

2 gal. per sq.ft./min.

Clear Water Storage—

134 MG.

It is recognized that Chicago has operated the new South District plant at rates of 3 and even 4 gal./min./sq. ft. for extended periods. Estimates show that if the design filtration rate was taken at 3 instead of 2 gal./min./sq.ft. the cost of the entire plant would be affected by approximately 5%. However, the 2 gpm/sq. ft. rate provides a 50% greater factor of safety against algae clogging, and a greater ability to follow hourly rates at all times, and thus permits greater retention of water in the clear water reservoir.

Projects Considered

Having arrived at the quantities of water to be provided in the central and north districts respectively, and established basic design factors, studies were then made of the most practicable sites for the filtration plants. Three sites were tentatively selected in each district for study.

The three sites considered for the north district plant are:

(a) The Clarendon Beach site immediately north of the Lakeview station.

(b) The park site located on the knoll northeast of the Lakeview station in the park.

(c) The Montrose harbor site located in the lake on made ground attached to the "nose" of the harbor.

The estimated costs of these sites were respectively—

$19,935,000 for the Clarendon Beach site,
$20,231,000 for the park site, and
$22,104,000 on the lake front, Montrose harbor site.

The Clarendon Beach site was found to be too small even for present conditions and therefore although somewhat the cheapest in cost, was considered undesirable on account of space limitations. The site in the park was considered best for a north district plant on the assumption that the space could be made available by negotiation with the Park District.

In the central district the three areas studied were:

1. The lake shore site on made land adjoining the Outer Drive, immediately north of Navy Pier. The estimated cost of a 630 MGD filtration plant, sufficient to serve the central district up to about the year 1970 on this site, was $35,118,000.
2. An inland site, later referred to as the "blighted area site" located between Oak and Division Sts., and Orleans and Crosby Streets, estimated to cost $43,096,000.
3. An island site built wholly on made land located immediately outside of the breakwater opposite Oak St. A plant at this site was estimated to cost $39,050,000.

Of these three sites for the central plant, the shore site was much superior. It was lowest in first cost, had the best facilities for transportation and access, better facilities for tunnel connections, and was in every way superior to the other two sites. As a result, therefore, of the study for the individual plants, it was found that the park site for the north district and the shore site for the central district, were the best.

Individual Plants Vs. Union Plant

In the studies of the individual plants it became evident that there would be some advantages in supplying both districts from a single plant. The engineers accordingly made a study of individual plants vs. a union plant. The union plant would be approximately $5,000,000 higher in first cost due to the construction of a 16 ft. tunnel connection between the central district and north district, but was estimated to save $307,000 per year in operating expenses. After paying for the fixed charges on the 16 ft. tunnel cost, there would still be a net annual saving of approximately $140,000 per year.

In addition to the economic advantage of the union plant, there are other advantages, namely:

1. The union plant will give all Chicago filtered water at one time. Each district will help the other to secure filtration. Experience of the past would indicate that if both districts are not provided with filtration at the same time, it will probably be two decades before the second district has it.
2. The reserve and storage capacity in the union plant is more useful to two districts, to either one of

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South District

(*Continued from Page 44*)

mind the experience of the department in locating the South District plant, recommended that Alvord, Burdick & Howson, and Greeley and Hansen be retained to report on size, location, and general design of the proposed facilities. These firms possessed several distinctive qualifications for the job. They were, and are, outstanding among the water works engineers of this country; their experience in filtration design had been broad; between them they had designed most of the filtration plants on Lake Michigan; and, in addition to advising on the South District filtration plant, they had been consultants on the two next largest filtration plants recently built on the Great Lakes, at Milwaukee and Toledo. Each firm had been established in Chicago for many years. They understood thoroughly Chicago's desire to maintain an attractive lake front.

With this combination of technical skill and thorough knowledge of local conditions, it was believed that their recommendations would be based on a correct evaluation of all the factors entering into the selection of a plant site.

North Central Districts

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which it can be diverted in an emergency, than is the same amount in reserves segregated between two individual areas capable of being used solely within those areas.

3. Land acquisition has been demonstrated at Chicago to be difficult, slow and costly. It would certainly be at least twice as hard to secure two acceptable sites as it would be to secure one.
4. Now is the time to settle the site acquisition problem once, instead of twice, and for all time.
5. A union plant will filter water at least cost.
6. The tunnel connection between the north tunnel districts, which is provided in the union plant plan, provides a safety factor not available in districts isolated as they are today. Had the union plant on the lake shore site been built a year ago, the north district would not have been out of order due to ice trouble at the crib.

For all of the above reasons, the consulting engineers recommended the construction of the union plant of 950 MGD.

The engineers next devoted their attention to a study of the three sites considered as best for the location of the union plant. These were the same three sites considered earlier for the construction of the central plant only. Obviously, with 630 MGD to be distributed from the central plant and 320 MGD in the north district, the best location for a union plant would be in the district where there is the greatest use. Considered as a transportation problem only, the difference between the quantities involved in the two areas, amounts to more than a million tons of water per day, which is in itself a major transportation problem, and indicates the preference for the location of the plant in the central area.

The estimated costs, in round figures, of the union plant at the three sites were as follows:

Lake front site.....$61,000,000
Blighted area site.....$70,000,000
Island area site.....$67,000,000

The engineers recommended the lake front site for the union plant. Subse-

quently, the question of sites was referred to the Chicago Plan Commission. The Chicago Plan Commission in studying the matter issued a statement of policy with respect to the use of the lake front, namely, that "It is hereby declared that it long has been and shall remain the policy of the commission to oppose in principle any use, public or private, of Chicago's lake front * * * for other than recreational and cultural purposes." Certainly that is a policy with which the consulting engineers, and I believe all conversant with the accomplishments of the Plan Commission and others in preserving Chicago's lake front, will agree. It was only when the Planning Committee of the Plan Commission stated that it "believes that the construction of the filtration plant at the Navy Pier site would be in conflict with this long accepted policy as expressed in this resolution," that the consulting engineers take exception. It is believed there is nothing that could better combine "recreational and cultural purposes" than the construction of a water filtration plant supplying the community's most important requirement for life itself, designed with proper consideration to the area in which it is located and its recreational possibilities.

Of the area required for a union filtration plant, some 55 acres, approximately three-fourths, will be available for park and recreational uses. The Design Department of the City Engineer's office has made a rendering of a study of the utilization of this site with recreational and cultural requirements in mind.

Because of the position taken by the Chicago Plan Commission, and by certain property owners in the lake front area opposite the proposed filtration plant site, hearings were conducted before sub-committees of the City Council. Later, action will be taken by the Finance committee of the Council as a whole. The question of site is still undertermined. In the meantime, planning is in abeyance and several hundred thousand dollars of state and federal money allotted for the design is in jeopardy.

In presenting the situation to the Council committee, the consulting engineers pointed out the advantage of the lake front site as follows:

1. The lake site is approximately $10,000,000 lowest in first cost.
2. The cost of clearing the blighted area site recommended by the Chicago Plan Commission would be approximately $2,500,000. It

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Filtration for North And Central Districts

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would be possible to clear up this slum as the Planning Commission desires, build the plant on the lake front where it ought to be, and still save $7,500,000 above the cost of the development at the blighted area site for filtration. In this way the entire blighted area would be available for recreational use, instead of only three-fourths of it being available if occupied by the water works.

3. The Chicago water works is not in the slum clearance business. If it were, and had this $10,000,000 to spend, we as sanitary engineers, would prefer to see the $10,000,000 spent in cleaning up four slums, each costing $2,500,000, and the plant constructed on the lake shore site where it can best and most economically supply the water requirements of 3 million people.
4. The lake shore site is the safest; it has two separate intakes, as compared to a single intake tunnel to the blighted area site.
5. The construction at the lake shore site deprives no one of housing. To clear the blighted area site would remove 1,674 dwelling units, 130 business establishments, 2 schools, and a church. With the present situation with respect to housing and congestion in schools, providing facilities for those displaced is a difficult problem requiring both money and time.
6. The lake shore site is superior from the sanitary standpoint. It is virgin territory. The blighted area site is now traversed by four north and south streets and three east and west streets, all of which would be completely blocked. The area is cut up by a maze of sewers, drains, and utilities, built over a period of from 50 to 100 years ago, with locations frequently unplotted.
7. The lake shore site can provide more recreational facilities than can possibly be provided inland, even on the same area. It is admitted, however, that there are probably more people who can use recreational facilities at the inland area than would use the lake shore site for recreation.
8. The lake shore site, however, would offer some recreational facilities not possible at an inland site. It would provide a 1½ mile drive surrounding the made land area, which will give an unparalleled opportunity to view Chicago's imposing sky line. It would give a breathing spot of 55 acres on Chicago's lake front to enjoy the cool breezes on a hot night. It would provide parking space for 700 to 1,000 cars, for enjoyment of the skyline or cool breezes. It would provide an educational opportunity near the center of Chicago, of visiting the world's largest filtration plant purifying the most essential requirement for life itself. It would give Chicago citizens opportunity to see a part of their $200,000,000 water works, of which more than 75% is hidden underground.

For all of the above reasons, the engineers reported that the best location for the union plant was at the lake shore site. With respect to the blighted area site, they stated, "As to the relative merits of these construction sites, it should be noted that the inland site (blighted area), by far the most expensive, has no compensating advantage in cost of operation. This site appears to be the most costly and least advantageous of the three sites considered." The engineers consider the island rather than the blighted area site as second best.

It is hard to appreciate the magnitude of handling 950 MGD of water per day. This union plant will handle 4 million tons of water per day, a tonnage four times as great as all of the railroads, trucks and boats serving Chicago. There is just the same reason for locating a water works near water as for locating a harbor on the lake front.

In conclusion, Chicago needs filtration. It needs it now. It is believed it can be best, most economically, and most quickly secured for all of Chicago through the construction of a union plant located on the lake front site.

The Yangtze Gorge Project

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The proposed general layout of Yangtze gorge project embodies a suitable and economical general design for the power features including the forebay channels; penstock trashracks; penstock bulkhead gate facilities; inclined penstocks; tailwater bulkhead gate and access tunnel. The underground power plant, including the right and left powerhouse and transformer tunnels, will include space for one hundred 175,000-kilowatt main power units and fifteen 20,000-kilowatt station-service units; also space for three hundred 58,500-kva. single-phase transformers; high-voltage cable shafts; and the 230,000-volt outdoor switchyard that will be segregated into six-unit bays and arranged to fit the natural surface topography.

Underground Power Plant

All studies of the power plant were predicated on the requirement that any such concentration of power should be placed underground for protection against bombing. The economic studies for determining the location and general design of project included the preparation of alternative designs and comparative cost estimates for five different project locations and for two different general designs or layouts of the power plant, together with many alternative studies of various features of the power plant. The adapted location and general design involving construction of the two underground powerhouses at the No. 3 project site, with all units in each powerhouse tunnel installed along a single axis, proved to be economical and especially suitable from the viewpoint of satisfactory operation and maintenance.

It should be noted that three main units discharge into one 65-foot horseshoe-shaped tailrace tunnel, and that the downstream portions of the ten plugged diversion tunnels are of this shape and utilized as tailrace tunnels for thirty of the main power units in the right power plant. The 65-foot horseshoe-shaped tailrace tunnels for the remaining power units in the right power plant extend from the junction points of each three-unit group of draft-tube tunnels to the Yangtze River downstream from the dam. Likewise, the tailrace tunnels for the units in the left power plant extend from such junction points to the tailrace channel leading to Chang-Chiao-Chi River and thence to Yangtze River downstream from the dam.

The multiplicity of problems involved in passing ships in both directions between the reservoir and river below the dam has presented many difficulties.

The first nine units to be completely installed at the end of the construction period should be located immediately beyond the diversion tunnels and toward the river end of the right power plant. Installation at this location can be completed without awaiting closure of the diversion tunnels. It should be noted also that the construction and installation of all additional power features, including the excavating and concrete lining of the penstock tunnels, powerhouse tunnels, and the tailrace tunnels, would be completed by stages as required by the growth of power load. The feasibility of stage construc-

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The Yangtze Gorge Project

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tion of Yangtze gorge project is most important.

It obviously is difficult to estimate the length of time required to absorb 17,500,000 kilowatts of power in China. An estimate of the absorption period was prepared by engineers of the Bureau of Reclamation, including a comparison with the growth of power-load in the United States following the year 1906, at which time the total installed power was less than 3,000,000 kilowatts. In this estimate, the Bureau engineers assumed that China's present available power, exclusive of Manchuria, approximates that of the United States in 1906; and that China's requirement for industrial development during the coming 40 years would be 50 per cent of its total power growth, as was experienced in the United States. On this basis, the total 40-year power growth of China was estimated to be 56 per cent of the total 40-year growth of the United States. The estimate indicated that the Yangtze gorge project would provide 45 per cent of the total power growth of China, exclusive of Manchuria. On the basis of the Bureau estimate, the 17,500,000 kilowatts of power developed by Yangtze gorge project would be absorbed within an area enclosed by a circle of 400-mile radius centered at the project. This area-estimate is predicated on the belief that it will be feasible to transmit power 400 miles or more by the time Yangtze gorge power becomes available.

Financial studies made by Bureau of Reclamation engineers have indicated that the power facilities could repay all costs chargeable to power production on the basis of 4 per cent interest within a repayment period of 50 years. No financial study has been completed for the other functions of the project, including irrigation, navigation, flood control, silt control, and other minor functions; however, it is believed that such studies may show equally satisfactory repayment possibilities.

The Dam

The proposed dam in Yangtze gorge will be of straight-gravity type, except that the left abutment portion will be located at an angle to the river-channel and to the right abutment portions, because of topographic and geologic conditions. The river-channel portion of the dam will contain the overflow spillway controlled by seven 135-foot by 56-foot drumgates, together with one hundred and twelve outlet conduits protected by semi-circular reinforced-concrete trashrack structures and controlled by 144-inch ring-seal gates. The dam will be protected against erosion from flood and outlet flow by means of an unusually long and massive hydraulic-jump apron.

The dam will be designed to withstand severe earthquake effects, which also will provide additional security against vibration effects from the unprecedented depth of flow over the spillway crest. The abutment portions of dam will contain the power intakes embodying semi-circular reinforced-concrete trashrack structures, bulkhead-gate slots, and air vents. The inclined plate-steel penstocks will extend through the base of the abutment portions of dam and through concrete-lined tunnels to the power units in the underground powerhouses.

The dimensions of the hydraulic-jump apron are generous. It will be noted that this apron has been given a flat slope, namely one-in-ten, and that the length and thickness dimensions are unusually large. This is because of the great depth and volume of flow over the spillway.

The general and detail designs of the drumgate are similar to those for the 135-foot by 28-foot drumgates at Grand Coulee dam. However, the Yangtze gorge drumgates will be 135-feet by 56-feet, or just twice the height of those at Grand Coulee dam. These colossal gates are required because of the relatively narrow gorge and the unusually large maximum discharge of Yangtze river.

The general design of the 144-inch ring-seal gate follows standard practice of the Bureau of Reclamation. However, the size of the Yangtze gorge gate exceeds that of any gates installed heretofore. Two 36-inch air vents are provided for aeration of the outlet flow and these appear sufficient for the purpose. However, it will be necessary to conduct careful hydraulic-model tests to confirm the effective distribution of the entrained air within the conduit flow. In this connection, it is believed that the jet-flow type of gate, another recent Bureau of Reclamation design, may provide more effective air entrainment and therefore better protection against cavitation than the ring-seal type of gate.

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WSE Committee Acknowledgements

Because of space limitations in the WSE Year Book, there was not room for complete committee rosters of the larger committees. Western Society wishes to acknowledge the work of the following committee members at this time:

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WSE Committee Acknowledgements

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Junior, Richard I. Gavin, John P. Gnaedinger.

Consulting Engineers' Division

The Nominating Committee of the Consulting Engineers' Division has nominated the following two Corporate Members as the regular ticket for Councilmen of the Division, for a term of three years beginning June 1, 1949:

Leonard C. Childs, Partner, Battey & Childs

William M. McConnell, Engineer, J. L. McConnell & Associates

In the absence of receipt of any suggestions by May 27, these nominees will be considered elected.

University of Illinois To Give Pre-exam Refresher Course

The University of Illinois, through its Extension Division, will conduct a pre-examination refresher course for engineers taking the December, 1949, Professional Engineering exam.

The plans were announced this week by the Joint Educational Committee, composed of representatives of the ASCE, AIEE, ASME, AIME, and WSE, who had been arranging for the course.

Engineers qualified to apply for a Certificate of Registration under the Illinois Professional Engineering Act, will be eligible for the refresher course.

The cost will not exceed $25.00, and registration will begin immediately, closing the first week in September. The course will begin the second week in September, and tuition will be payable at that time.

Classes will be held during evening hours at the University of Illinois Navy Pier Branch here in Chicago.

ADVANCE REGISTRATION BLANK

To the University of Illinois
Extension Division
Illini Center
LaSalle Hotel
Chicago 2, Illinois

I wish to register in the Pre-Examination Engineering Refresher Course.

I prefer attending classes:

☐ Monday and Wednesday, or ☐ Tuesday and Thursday

Name .....

Address .....

Telephone .....

Engineering Field .....

(Tuition Payable on Entrance Night)

WSE Applications

(Continued from Page 43)

343-80 Noble G. Larson, Section Engineer, Commonwealth Edison Co., 72 W. Adams St.

344-80 Thomas A. Wiley, Junior Subway Civil Engr., Department of Subways & Superhighways, 20 N. Wacker Dr.

345-80 John Dolio (Rein.), Partner, Shaw, Metz & Dolio, 208 S. LaSalle St.

346-80 Walter C. Carlson (Rein.), Mechanical Engineer, Vern E. Alden Co., 120 S. LaSalle St.

347-80 Donald E. Ennis, 8233 Kenwood Ave., attending Illinois Institute of Technology.

348-80 Carl H. Kreutziger, Contract Manager, A. J. Boynton & Co., 58 E. Washington St.

349-80 Edward G. Wicklatz, Chief Engineer, Alemite Div., Stewart-Warner Corp., 1826 Diversey Pkwy.

350-80 Louis A. Smith, Maintenance Engineer, Illinois Bell Telephone Co., 212 W. Washington St.

351-80 David Dickson, Estimator & Field Expeditor, Butler Brothers, 430 W. Randolph St.

352-80 E. G. Olson, Construction Supervisor, Butler Brothers, 430 W. Randolph St.

353-80 Edward M. McMillan, Assistant to Chief Engineer, Massey Concrete Prod. Co., 122 S. Michigan Ave.

The Yangtze Gorge Project

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The vertical distance through which the ships will have to be raised and lowered will be about 600 feet. The fluctuation of the reservoir due to varying dead-storage levels will be between 75 and 150 feet. Also the river level below the dam will fluctuate about 50 feet. These and other difficulties required consideration of a number of alternative schemes for the navigation facilities. However, the only scheme that proved to be entirely feasible and economical is embodied in the two-system, eight-step ship locks, equipped with standard miter gates of the general design proposed for the third lock at Panama Canal. The studies indicated that the miter gate should be limited in height to 126 feet.

Consideration has been given to two alternative sizes for the locks, namely a size suitable for handling 10,000-ton cargo vessels, and a size suitable for a cruiser 610 feet long, 70 feet wide and having a draft of 33 feet. It is believed that ultimately provision will be made for the passage of vessels of 33-foot draft between Shanghai and Chungking, and therefore that the larger locks will be desirable. The decision regarding these questions thus far has been left to the future.

Careful consideration has been given also to several alternative locations for the ship locks. On the basis of economic studies embodying comparative estimates of cost for different layouts and locations, it has been determined that the ship lock location available at the No. 3 project site is the most satisfactory. The lock system at the No. 3 site will have quiet water at both the upstream or reservoir end and at the downstream or river end. Such conditions are essential in avoiding damage to ships entering or leaving the locks. Any location of the locks that involved the handling of ships in the turbulent waters of the gorge or in the turbulence caused by flow over the dam would be very dangerous and unsatisfactory.

Fortunately the ship locks like the power plant can be constructed in stages, wherein the full excavation for the channels and lock systems can be completed and only one of the two lock systems constructed as the first stage. In this manner the duplicate lock system would be constructed as the second stage whenever warranted by increased traffic conditions. During construction of the dam, passengers and river cargo will be unloaded at docking facilities located at either entrance of the ship canal. They will be transferred by motor vehicles over a system of roads to docking facilities at the reservoir or river end of the ship canal where they will load on ships operating upstream or downstream from the dam.

Possible Tonnage

The tonnage handled by the single or double lock system will depend on the size of ships, in that small boats occupy space out of proportion to the tonnage. It is estimated that a single system of locks will handle 25 to 30 million tons per year and that a double system will handle 60 to 75 million tons per year. The necessity of adequate transportation in the development of China is of prime importance. Power development without transportation facilities has very little value. It is anticipated that

the growth of tonnage on the river will parallel the power growth.

The problem involved in excessive fluctuations of the reservoir level was solved by the use of two miter gates, one above the other. The top gate would operate during high reservoir levels and the lower gate whenever the reservoir level is low. At some intermediate stage of the reservoir level, both gates would have to be operated. Although these methods of operation during excessive drawdown or low dead-storage level are considered feasible, careful consideration will be given to the alternative plan of limiting the drawdown to about 88 feet, to permit the use of single 126-foot gates in the upper lock, even at a substantial loss of power revenue. The construction of ship locks using the single-gate lock system would be much simplified and the cost would be substantially reduced.

Ship-lock Installation

The ship-lock installation and maintenance operations have been studied in considerable detail by Bureau of Reclamation engineers. The conclusions are that these operations will require a large-capacity gantry crane operating over each lock system. These cranes will be designed to travel on an inclined or a level track. Eight motors geared to racks adjacent to each track will provide positive drive and safety. These cranes will be of multipurpose use in that they will be available for the initial installation of all equipment including the completely assembled miter-gate leaves. The cranes also will handle the emergency upstream and downstream closure stop-logs. For maintenance purposes these cranes will be used to remove damaged gate leaves and to install completely assembled gate leaves, also for removing and replacing complete gates and other equipment in the water-supply system, as well as other major equipment connected with the locks. They obviously would be used also for removing damaged vessels from the locks.

The present plans contemplate that the miter gates will be completely fabricated and assembled in the United States and that they will be towed like barges to the damsite. This procedure will avoid the difficulties and excessive cost of field assembly, and ensure that all gates of the same size are interchangeable. By these means, the saving in field-erection costs will much more than offset the cost of the cranes.

Engineering Societies Personnel Service

84 East Randolph St., Chicago 1, Ill., ST ate 2—2748

These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated, including postage to cover forwarding and return of application. If placed in a position as a result of a Men Available or Position Available advertisement, applicants agree to pay the established placement fee. These rates are available on request and are sufficient to maintain an effective non-profit personnel service. Prepared MEN AVAILABLE advertisements limited to 35 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge. A weekly bulletin of positions open is available to subscribers. Apply ESPS Chicago.

MEN AVAILABLE

Civil Engineer, 2 yrs. exp. as project engineer on const. of airfields, also inspection of const. on grading, storm sewers and some design. Prefers location outside of Chicago. $4800. 84-W

Structural designer and draftsman, considerable experience on variety of steel and concrete work, bldgs. roads material handling eqpt. Interested in office or field work. $5000. 85-W

Elect. Engineer, 29, experienced in electrical design, power and lighting layout on industrial and commercial buildings. $5200. Location Chgo. 86-W

Time Study Engineer, 26, exp. in time and motion study for large mail order house. Interested in industrial management, timestudy, sales or safety. $3300. 87-W

Civil Engineer, 28, experienced in construction dept. of large packing house, struct. des., drafting and field work. Sal. $4000. Midwest location. 88-W

Industrial Management Engineer, 30, exp. in industrial eng. and material handling, also exp. in selling clients and supervising work on clients accts. Interested in factory management or sales engineer. 89-W

Factory Manager, 45, complete charge of plant on scheduling, production control, personnel, also 15 yrs. exp. as industrial engineer, various fields. Salary $6000. 90-W

Industrial Engineer, grad. 36, exp. with switchboard mfr. Also 3 yrs. with candy company as Industrial eng. studying factory operations, standards, etc. Salary $5400. Location Chgo. 91-W

Sales Engineer—metallurgical, 30, past two yrs. operating own company selling powdered metal alloys, previous exp. as metallurgist with a smelter and refiner, also with mfr. of forgings. Interested in sales or metallurgy. $6500. Midwest. 92-W

Development Engineer, M.E., 34, exp. on development of automatic control mechanisms, & lab. eqpt., also Ch. Engineer on design and production of products used in high tension switching eqpt. Prefers sales or development. $6000. 93-W

Industrial Management Eng. 45, exp. includes Ch. Eng. for furniture mfr. Staff Eng. for industrial management firm, aeronautical firms, etc. $6000. 94-W

Research Engineer—mech. exp. on research and development of mech. r.r. specialties, also 12 yrs. exp. with utility on spec. assignments for promotion of uses of elect. power and by-products; preparation of material; interested in sales or research. $6500. Any location. 95-W

Civil Engineer, graduate, 25, 9 months exp. as elect. asst. on research in connection with struct. research on railroad bridges. Interested in drafting, teaching or field work. 96-W

Mechanical Eng., advanced work in math., 35, 10 yrs. on des. and development with mfr. of valves, fluid flow, etc., past 2 yrs. Mech. and Service Eng. on low and high pressure steam boiler rooms. $4800. Midwest location. 97-W

Mechanical Engineer, 28, past 14 months asst. eng., liason wk. between facty. & eng. dept. for mfr. of elect. ranges, previous 5 yrs. research eng. on metal containers. $4800. Any location. 98-W

Recent Graduate—mechanical, 22, interested in sales, production or indus. eng. on htg. and vent. Any location. 99-W

Recent Graduate—electrical, 24, interested in development, plant eng. 100-W

Elect. Eng., 23, exp. on installation of material handling eqpt. for consultant on railroad coaling stations, also elect. const. eng. on sewers and sanitary work. $3000. 101-W

Ch. Eng. graduate, 50, exp. as Ch. Eng. & Wks. Mgr. on valves and controls, also 20 yrs. exp. Supt. of elect. utility managed-meter dept. and test lab. $8000. Any location. 102-W

POSITIONS AVAILABLE

R-5632 Project Engineer, M.E., building construction field, capable of handling all design, specification writing and erection supervision of heating, ventilating, air conditioning, plumbing and electrical installations of university buildings. Salary open. Location: Illinois.

R-5629 (a) Metallurgist (graduate), age 25-35; fair amount metallurgical experience, high melting refractory metals and alloys, for employment in research, development, with metals company. Salary $300-$400; Location: Northern Illinois. (b) Recent graduate Engineer or limited experience for above. Salary approximately $250.

R-5631 Mechanical Draftsman, several years drafting heavy machinery, detail, layout and redesign present equipment for printing company. Salary $70 to $75 week. Chicago.

R-5630 Construction Engineer, (assistant superintendent), general industrial construction job. Temporary—about 4 months. Salary $400.

R-5628 (c) Chief Test Engineer, electrical background, several years' testing of power switchboards, D.C. motors and heavy electro-mechanical equipment as applied to printing press equipment. Salary approximately $5000. Location: Chicago.

R-5628 (b) Designer Grad. E.E. 5-8 years electrical control circuits applied to intricate machinery and mechanical installations. Design and layout control circuits and prepare structural and mechanical drawing required for mounting and installation for a manufacturer printing press equipment. Salary $5000-$6000. Location: Chicago.

R-5628 (a) Designer (supervisory) grad. M.E., approximately 35; 10 years experience heavy machine design and general machine shop operations, some electrical control; 3 or 4 years should be supervisory. Group design leader for manufacturer printing press equipment. Salary $5000-$6000. Location: Chicago.

It's easy and pleasant to go to school in the Chicago Area . . .

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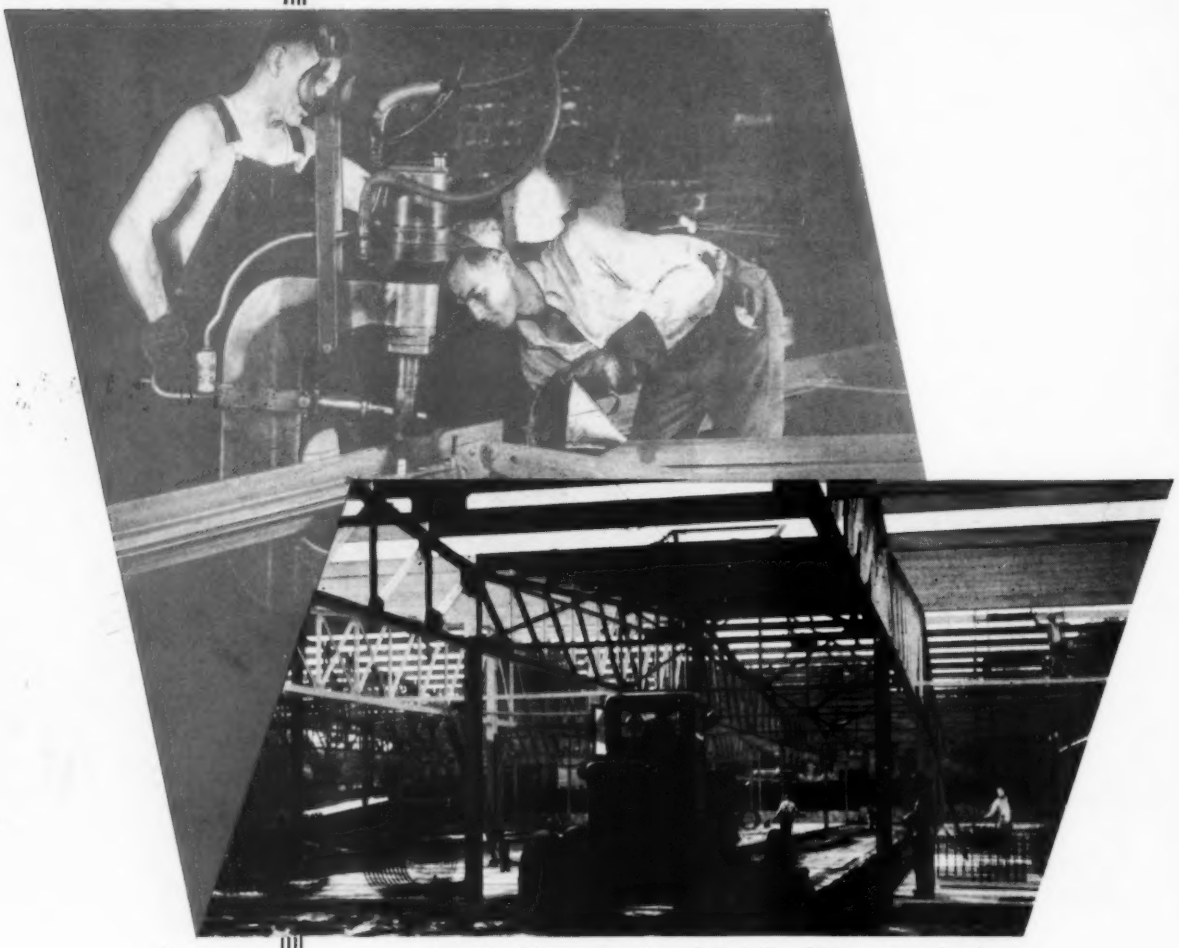

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